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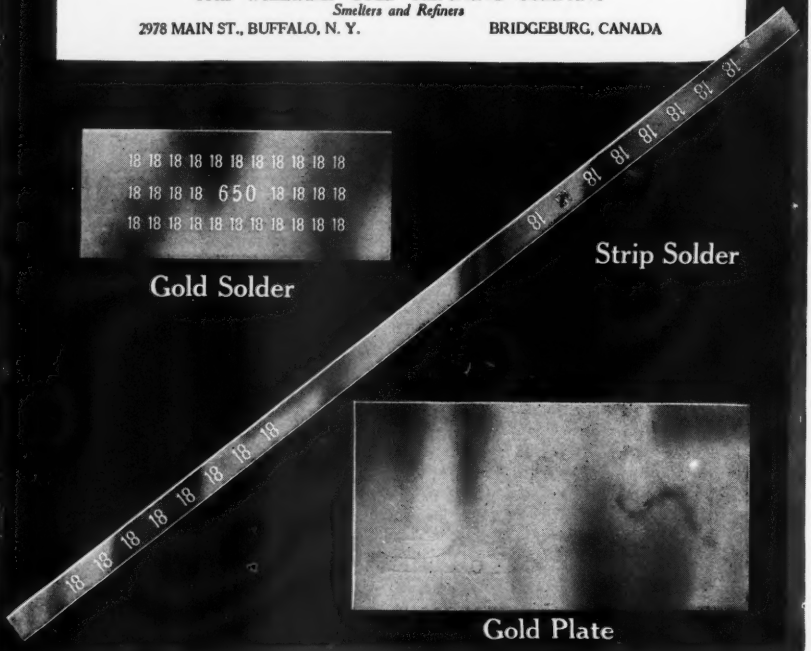

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COLOR OF THE TEETH*

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Although the mechanical part of crown and bridge work has been justly commended, yet it cannot be denied that something more than excellence of craftmanship is implied in the many hyperbolical descriptions extolling the fineness of the work and its truth to nature. What is really implied in these descriptions is this: That crown and bridge work has passed beyond mere science; in fact, that it is an art. Do not let it be inferred that I intend to belittle in the slightest degree the mechanical ingenuity which has found expression in the evolution of the artificial crown; what I have to say has been suggested by the claims of dentists themselves.

If crown and bridge work already has a place among the arts, it is altogether fair to ask, what is its technic? What are its standards? I have only to phrase these questions, and they answer themselves immediately. I do not mean to suggest here that there are not favored individuals in the profession who are endowed with some special love for art and a perception of its more palpable beauties, who pick up in the course of time a great deal of empirical knowledge, working their way back to first principles through studies and reflections that should have been offered as a preparatory course for their work. My point is this: Whereas there is a technic, a code of procedure for the mechanical part of the work, which serves as a guide to the student of dentistry, there is no such guide for the higher aspect of the work—that aspect which gives us the right to consider the replacing of the natural crown by the artificial one as among the fine arts; all this is left entirely to the individual. It would be idle to deny that individuals have accomplished nothing; often, indeed, they have accomplished a great deal, but only as *individuals*. Each one who obtains any results in this field laboriously works out for himself his own theory and practice; and when he passes away,

*Read before the Indiana State Dental Society, 1918.

his art perishes with him. I need not insist on the loss of effort caused by this method of working, nor upon what the profession as a whole loses by one person not being able to begin where another leaves off. It is as if all the knowledge that the first generation of men acquired should disappear with them, as if the new generation must begin again at the bottom. World-progress under such conditions would have been impossible. The word *civilization* would never have been born. Progress on the artistic side of dentistry is likewise impossible without formulating and codifying the experience of individual dentists. A manual of principles and rules of guidance must be drawn up. Future students ought to have it made possible for them to profit by the knowledge and discoveries of dentists who precede them.

Although I thus analyze the existing situation with respect to dentistry as a fine art, yet I do not assume to possess a knowledge of such compass as would enable me to formulate a course of study, even of the most elementary character, in this particular branch. Nevertheless, my years of endeavor in comparison with their puny results, and my discouragements as an instructor have made the formulation of some definite principles of art technic appear to be a permanent necessity. The thought has been many times driven home to my mind that under proper guidance, using the discoveries of those who have preceded me, or, of my contemporaries, it would have been very easy for me to have acquired long ago even more than that which I have painfully and imperfectly learned by experience alone. This paper is, therefore, not intended to be a treatise on technic; it merely expresses my individual theories, knowledge, and convictions on one particular point.

It is agreed, I am sure, that crown and bridge work ought really to be an art. It is then proper and necessary to ask which one of the many definitions of art would best apply to it. Upon careful consideration I have found the answer most appropriately given in the trite but revealing epigram: "True art is to conceal art." In this epigram we also find described our difficulties and limitations. For we must reproduce nature exactly as we find her. Even her variations and imperfections must be copied. And right here our restrictions begin to make themselves felt. The artist in oil or marble has more latitude than we have. It is always within his power to flatter a little. In more dignified phraseology, he idealizes nature. He finds her unfinished and imperfect. She has good intentions, of course, but as Aristotle said, she cannot always carry them out. We dentists, however, cannot take liberties with our art. If we adopt as our ideal motto: "True art is to conceal art," we must mean—as we ought to mean—that we are going to try to make a real imitation of nature, an imitation so perfect that nature herself would

be deceived. In a word, we must compete with nature. Only when the observer cannot tell which is art and which is nature, can our work be considered wholly successful and artistic.

Such perfection of imitation inevitably implies an intimate study of nature. And indeed, the best artists of every period and of every department of art have developed upon this foundation. We, in our field, claim to be artists, but do we begin where we ought? Do we, in any complete sense, go to nature? Permit me to answer this question by asking another more concrete: If we studied nature carefully, instead of copying from each other, would we be satisfied to work with the conventionalized teeth which are furnished us by the manufacturer? We know that the bit of porcelain with which we make our crown is, as to characteristics, shape, and color, utterly unlike the human teeth. Rarely, indeed, can a porcelain be found which exactly fits, in all particulars, the case in hand.

It may be asked at this point: Why does not the manufacturer give us better teeth with which to operate? The answer is obvious: Because we do not require him to do so. He furnishes the profession with what is demanded, just as does any manufacturer. He is influenced in the production of artificial teeth by those shapes and colors which had the best sale the preceding year. And it is certainly not to be expected, in this unaltruistic age, that he will concern himself with a careful imitation of nature when dentists will unthinkingly take what is offered them. The product of the manufacturer is determined to a great extent by the large orders which are sent to him by the big advertising dental shops and laboratories. These shops order perhaps a hundred sets of teeth at a time. The point for us to note is that these teeth are all of one shape and color. In a recent conversation with one of the heads of a large dental manufacturing company, I asked whether the company would be willing to furnish a new set of models. He answered immediately: "When the dental profession knows what it wants, we will supply the demand; we cannot do business on any other basis." Certainly, manufacturers cannot be blamed for not undertaking to educate us as to what we ought to demand in order to do really artistic work. The fault, obviously, lies not with them, but with dentists themselves.

Perhaps it would be well at this point to look for a moment at the porcelain facings furnished us by the dealer. I might discourse at length on their unnatural shape, but I shall pause only long enough to say that the authoritative treatise on the anatomy of the teeth by Dr. Black and Dr. Brownell leaves no excuse on the part of manufacturers for furnishing us with such sorry imitations of the natural crown as we are obliged

to use. I might also dwell on the fact that by far the largest percentage of indications for Richmond crowns are in the mouths of patients past middle life; and yet the facings furnished have the appearance of the teeth of youth. They show no signs of age, no marks of wear. I know well, however, that abrasion, erosion, and even atrophied enamel formations may be imitated by grinding and by the use of high-fusing colors. I believe that we have a right to demand that the manufacturer furnish us with teeth which show all of the peculiarities of age. But it is not these things which I wish to emphasize in this paper; I wish to discuss the color of the teeth.

In the American-made teeth furnished us, the pigment, in a large proportion of the facings, is not properly distributed; it is put on the lingual side of the facing, and extends only over the gingival third. It follows that should we succeed in getting a facing somewhere near the size and color desired, the grinding of the gingival bevel which would be necessary in order to have the facing approximate the labial bevel of the band, would mean the loss of color. Even if this were not the case, the color would still be defective in extent, since the color in the natural tooth, while gradually decreasing in saturation, extends in most cases to the incisal third. This is especially true of cuspids. Furthermore, while the natural teeth in the same mouth will be of the same hue, there will usually be found a marked variation in tint, shade, or saturation. The cuspids have the greatest saturation and the laterals the least. These facts must be familiar to every dentist who has the least clinical experience; yet the manufacturer seems to have overlooked them entirely.

In order to get at the problem before us it is necessary to inquire first of all into the probable source of the color in the teeth. It is my belief that the tooth-crown receives its color mainly from the dentin, although the pulp may be a contributing factor. About 25 per cent. of the dentin is made up of organic matter. After the death of the pulp the organic portion of the dentin disintegrates, causing the tooth to become darker, and in some cases, radically changing the hue. In old age, when the pulp recedes, the hue appears to become more saturated, resulting, in some cases, in a decided orange. Since, in my opinion, it is the organic matter of the dentin, which is mainly responsible for the color of the teeth, owing to the small amount of organic matter contained in the enamel, the color contributed by the enamel is probably negligible.[1] Indeed, American histologists are practically unanimous in agreeing on

[1]It is true that brown streaks are sometimes seen in the enamel, known as the brown striæ (stri-ah) of Retzen's; but these are regarded by Tomes as being due to nutritive disturbances during the developmental period, and may, therefore, be left out of account. Retzen.—Tomes' "Manual of Dental Anatomy," Chap. 3, page 58, 1890.

the absence of organic matter in the enamel. European histologists believe, however, that the enamel contains a slight amount of organic matter; but even they do not claim over 5 per cent. The amount of pigment contained in so small a percentage of organic matter would be hardly appreciable. Normal enamel, then, can be expected to contribute only white or brightness value to the color of the teeth. Very frequently, however, where the labial and lingual plates of enamel come together for a short distance on the incisal (most frequently seen in the lateral), the dark oval cavity is reflected through, and gives a grayish, and in some cases what appears to be a bluish, hue to the incisal. We have all experienced disappointment, I think, in trying to match this so-called blue tint in the incisal region. It is possible to obtain facings with a very washed-out blue tint at the incisal edge but they do not look natural when placed in the mouth.

Suppose, now, that we consider the enamel by itself. What is its color? We all have a more or less hazy notion, I think, but no exact symbol or symbols by means of which to express it. We usually call it gray. Do you mean by that what psychologists mean, namely, a mixture of black and white? The inexactness of our symbols of expression will be realized when I recall to your minds that although we are able to distinguish some seven hundred different brightness qualities between the deepest black and the most brilliant white, we have only about four symbols in common use by means of which to express them all: black, white, light gray, and dark gray. I have come to the conclusion, through my own experience and by questioning a number of my fellow-practitioners, that the enamel of the teeth may well be compared to a white pearl. This comparison may be best appreciated by examining the rounded cusps of a freshly extracted bicuspid or molar. And indeed, to refer to the youthful denture as a row of pearls is not inappropriate. The teeth of people of mature years, however, never receive such poetic comparison, for the enamel becomes stained with age. In this sense alone can the enamel be said to contribute to the color of the teeth.

If we make a casual examination of the stock of teeth at the dental depot, we would be inclined to say that the hues, tints, and shades of the solar spectrum were fairly well represented. Yet to the initiated the imperfection of the display is altogether too evident. And who of us has not repeatedly been disappointed in trying to match the human teeth? We are all more or less convinced, I am sure, of a serious defect somewhere. When we stop to think, however, our sense of justice, as I have said before, tells us that the blame does not rest alone on the dental manufacturers, for we ourselves do not, in most cases, know what we are really looking for. Even those favored persons who can carry

the hue in their memories, or in their eyes, as we commonly say, rarely have any symbol which will exactly express its position in the solar series. Our terminology is lamentably deficient. Perhaps we call the illusive hue yellow. It is then fair to ask whether such a color as pure yellow is to be found in the teeth of the Caucasians? It is generally true that the color of the teeth of the type called brunette will be found to be more saturated than in a blonde, and the pigment will be found to vary in proportion.. For nature, here as elsewhere, tends to maintain an equilibrium, or harmony, in the body pigments. In the eyes, hair, skin, and teeth there is usually a harmony of color. For example, if we should analyze the feelings we experience on first seeing a woman with her hair dyed red, the word *discord* would best express them, for the skin and hair would not be in harmony; and therefore the effect is quite the opposite from the one intended. A want of harmony between the hue, tint and shade of the teeth and skin is equally unpleasant, and yet I think it is an uncommon experience to see a porcelain crown that we cannot instantly detect, and which, if we were to pass judgment, we would pronounce off-color. In other words, we are conscious of the discord. My conclusion at this point is, therefore, that the first prerequisite for understanding the color of the teeth is to classify the types of human beings accurately, and name the color of teeth each type possesses.

If we had only distinct types to deal with, however, such as blondes and brunettes, the task of standardizing the color of the teeth might be comparatively easy. But by far the largest percentage of human beings are of that indefinite type which we class as brown-haired. Members of this class may have either blue or brown eyes, either light-brown hair or dark chestnut. Now, brown is a mixture of yellow and black; therefore it would not be accurate to symbolize this large group, the individuals of which are neither blonde nor brunette, as *brown*. Here we have another problem in terminology.

Enough has been said to show that we cannot get very far without accurate classification and symbols. We need the symbols to express our thoughts. Such a classification would not only result in more artistic production by the profession, and thus be a source of increased pleasure and pride in our chosen calling, and a great economy of time, but it would enable us to speak with authority; to agree on what we want. And the manufacturer could not lag far behind us.

It is not enough, however, to have the types of human beings accurately classified with a symbol designating the color of each; a knowledge of the fundamental laws which govern the phenomenon of color is a prerequisite to such an investigation. This appears on the face of it to

be a formidable matter. A brief sketch, in which I hope to show their practical application to the subject under discussion, will convince you, however, that the difficulties in the way of the standardization of the color of the human teeth are more apparent than real. *First*, let me repeat that the hues to be found in the different types before mentioned, need to be standardized. I have come to the conclusion that the hues to be found in the Caucasian race lie somewhere between orange and red, and orange and yellow, in the spectral series, with the addition of white and black values; and that all the other colors are due to the effect of what are known as the phenomena of simultaneous contrast, successive contrast and negative after-images. *Second*, we must adopt symbols or words which will express exactly the hue, tint, or shade indicated, and the degree of saturation; for pure tones are never to be seen in the teeth. In other words, we must have a systematized nomenclature of all the colors to be found in the human teeth.

The reason why we have no terminology for the colors to be found in the teeth, as well as in many other things, is due to deficient sensitivity and education. Yet natural history abounds in proofs that color discrimination is innate not only in man, but even in animals. Darwin[2] devotes several chapters to color discrimination among animals, and shows color to have a definite purpose and to be useful either as a means of protection or concealment from enemies, or as a means of recognition by their own kind. Colored fruits form by choice a considerable part of the food of monkeys in the tropical regions of the earth.

If monkeys can distinguish colors, then surely it may be inferred that so could the most primitive men. Tests on primitive people for the purpose of determining the sense-acuteness, have brought out the fact that their power of discriminating color was about equal to that of children in their first grade or in the kindergarten. In addition, the color vocabularies collected from different regions showed instances in which a single word was made to do duty for two or more color-sensations; that is, black and blue, for blue and green. All peoples, however, have a definite symbol for red. Such confused nomenclature naturally implies corresponding limitations in the degrees of sensory color-discrimination. And there are unquestionably other factors at work in determining the differentiation of the names for sensations. In the first place, it is quite conceivable that a sensation may not be of sufficient value or interest to receive a special name, although it is capable of being fully experienced and discriminated. Were we, for example, to ask of a civilized community what object they would describe by the word *gray*, surprising, indeed, would be the variety and incongruousness of

[2]Darwin, "Descent of Man," 2d ed., pp. 108, 279, 332, 335, 469.

their replies. Yet such confusion would not be inevitably the expression of deficient sensitivity. People could easily learn, under stimulus, the exact difference in meaning between gray and buff. The conclusion is that certain instances of confused terminology may be due simply to insufficient pains having been taken to analyze sensory experiences.

This conclusion is further borne out by a color test given at my request in the Irving Kindergarten School of St. Paul. The test was with Holmgren's wools. It was found that those children who had learned the names of the different colors could sort them, but those who did not know the names confused red with pink, and blue with violet. Faintly colored wools tended generally to be confused with one another.

From all this, I think we may safely and reasonably conclude that color-discrimination is innate; and second, that the power of discrimination among the finer shades and tints is only a matter of education. This second point has an important bearing, as you can readily see, on crown and bridge work considered from the viewpoint of an art.

But already in discussing a few of the factors that in my opinion, should be included in a treatise, even of the most elementary kind, dealing with the artistic side of the matter under discussion, I have used what might be called technical terms of a nature, which some will protest, no dentist can be expected to know or understand. Such a protest, of course, is a naïve confession of ignorance, because a knowledge of the vocabulary of color is a prerequisite to even an elementary study of nature. It points further to a serious lack in our educational curriculum. A scientist should certainly know the terminology of his science and related sciences. For the replacing of natural teeth with artificial substitutes is the one science and art which we cannot help practising; and if we cannot practise it well, we must continue to practise it poorly. In order, therefore, to make my points more intelligible, perhaps, I shall include at this point what must necessarily be a very sketchy and superficial review of the science of chromatics, and this merely for the purpose of making my nomenclature clearer.

Light—I refer to solar light—is the physical cause of our sensation of light. Webster[3] defines light thus: "Light is that agent, force, or action in nature by the operation of which upon the organs of sight, objects are rendered visible, or luminous." Without going into the various theories of light, let it suffice to say that it is composed of an indeterminate number of variously colored rays. The sensation of color depends upon a peculiar function of the retina, or optic nerve, in consequence of which rays of light produce different effects according to the length of their waves or undulations, waves of a certain length

[3]Webster, Noah, "International Dictionary."

producing the sensation of red, shorter ones green, and those still shorter blue, and so on. The color of objects depends upon their power to absorb or reflect a greater or less proportion of the rays which fall upon them. In other words, the natural color of objects results from the fact that one portion of the colored rays contained in white light is absorbed at the surface of the body, while the other portion is thrown back. It is the ray which is thrown back that gives the color to the object. For example, if the light which falls on an object is completely absorbed by that object, so that it disappears from sight as if falling into a perfectly dark cavity, the object appears to us black. On the other hand, if all the light is reflected from the surface, the object appears white. The rays may also be modified by the character of the surface.

You can readily see how this affects our science. If the object is polished, as are the surfaces of the artificial teeth furnished us by the manufacturers, the rays are pressed together, as it were. They are then thrown back as a solid beam. If, however, the surface of the object is irregular, as is, for example, the enameled surface of the natural teeth (I refer to the imbrication lines of Pickerell),[4] the rays are dispersed in every direction. While the unabsorbed rays may be the same as those thrown from a polished surface, yet we are immediately conscious of a difference in color. This has an important bearing on the color of the teeth. It is at once apparent that to obtain a perfect match in artificial teeth, we must have not only the same color, but also the same kind of surface. I have no doubt, however, that since both Pickerell and Williams[5] have called attention to this subject in their exhaustive monographs published recently, the tooth manufacturers will soon accept the suggestion.

Another matter that must be taken into consideration is the checks and cracks to be found in the enamel of the teeth as people grow older, especially in those of people past middle life. In the same way that the grooved surfaces of the enamel affect the hue of the teeth, so these checks and cracks must be counted as a modifying factor when matching artificial and natural teeth.

Since the color of the teeth is affected by so many factors, it will perhaps be wise to go more deeply into the definition of color. The psychologist recognizes three aspects of color: hue, degree of saturation, or purity, and illumination, or brightness. When a ray of sunlight is admitted through a small aperture in the window-shutter of a dark chamber, what is seen is a round and colorless image. If, however, a glass prism is interposed in its path, the beam on emerging from the

[4]Pickerell, "Prevention of Dental Caries," Chap. IV, pp. 62, 67, 69, 73.
[5]Williams, "New Classification of Natural and Artificial Teeth."

prism becomes refracted toward its base, producing on a distant screen a vertical, rounded band no longer white, but showing all of the hues of the rainbow. This is called the solar spectrum. What has happened is this: the white ray has been broken up into its elemental hues—red, orange, yellow, green, blue, violet. It is interesting to note at this point that here is the only place in nature where we get pure hues. The hues of the landscape, for example, are always modified by a mixture of white or gray light.

But to return to the matter in hand. Now if we should discover that the hues in the human teeth could be placed in the orange part of the spectrum, we would have an important starting-point. In order, however, to match the exact tint or shade of orange, it would be necessary to determine not only the hue, but the degree of saturation or purity. This can be best illustrated by charts[6] the first one showing the highest degree of saturation possible to obtain. The next chart is slightly less saturated, and so on through fifty charts. The last chart shows only a faint trace of the orange hue. The point to be noticed here is that the hue is the same. No other hue has been added because of the lower degree of saturation, for white is not properly a hue. It is not correct, however, to call the diluted orange tint, yellow. Yet this is the mistake made by the average person. A course in color-discrimination would not come amiss in order to avoid such common errors. The mistake of calling orange yellow has been made, I believe, by Dr. Clapp,[7] for the charts attributed to him and published in J. Leon Williams' book on "A New Classification of Tooth Forms" show the gingival third of the tooth as orange, in which there is a slight overlapping of yellow; the middle third *is* called yellow; and the incisal third, gray. While I believe that Dr. Clapp has distributed the hue about as it is found in nature, yet the pigment in the dentin will be represented, it must be emphasized, by *one* hue with a more or less degree of saturation.

Another interesting element enters into the situation. Those of us who have offices which admit the direct sunlight during certain hours of the day will appreciate the effect of illumination or brightness in changing the hue of the teeth. The red end of the spectrum when highly illuminated gradually changes to orange. If the brightness is increased, it appears yellow; and if still further increased, it looks white. The blue end of the spectrum, on the other hand, becomes gray under increased illumination. Conversely, if the spectrum is darkened, the red end looks brown or black, and the blue end looks black. This can be readily tested by walking at twilight in a garden filled with variously

[6]Charts used as illustrations.

[7]Page 67, Dr. Clapp's Chapter on Color.

colored flowers. As darkness gathers, the colors gradually disappear, even though the shapes of the flowers may be distinctly seen. The photograph illustrates the same thing. The hue here is left out, only degrees of brightness being noticed. In matching the teeth, therefore, the kind and amount of illumination under which they are seen has to be considered. Let me explain this matter more in detail. The natural teeth, because of their position in the mouth, surrounded as they are by the shadow of the lips, and back of them the more or less dark, oral cavity, will be under a very different illumination from the artificial tooth held in the hand or tweezers, or in front of the patient. In order to be sure that the artificial tooth will match in color the natural teeth, it is best to defer the selection of the tooth until the tooth to be crowned is ground off sufficiently to allow the facing to be placed in the exact position it is to occupy permanently.

Now, we must take into account one other thing in order to match our teeth successfully. If we look for some time at a red, and then look at a colorless wall or a piece of paper, we find that a greenish tinge is given to the colorless wall or paper. Similarly, if we do the same thing with a greenish object, we find it to be followed by a reddish tinge. Again, if we look for a time upon a yellow object, and then focus on a colorless ground the latter takes on a bluish tinge. Similarly, the blue is followed by a yellowish tinge. This is the phenomenon of *negative after-images*. Again, if I place a yellow and a blue alongside of each other, the yellow will appear "yellower." (i.e., more saturated) and the blue will appear "more" blue, at the line of junction. If I place a green alongside of a red, the green and red will each appear more saturated at the line of junction. This is called *simultaneous contrast*. Again, if I look from a yellow to a blue object, the latter will appear "more" blue, i.e., more highly saturated, than before. The same holds of the relationship of red and green. This is called *successive contrast*.

These things must be taken into account and guarded against if we would make successful matches of color. A bright object appears brighter when put alongside of a darker one, and vice versa. And just as the object that is placed alongside of the red takes on a greenish tinge, so the human teeth appear greenish when seen surrounded by the healthy red tissues of mouth and lips. Thus teeth that in themselves are of a decidedly orange hue, will often appear greenish yellow, as a result of their being surrounded by very red tissues. In short, the factor of negative after-images and simultaneous and successive contrast tend to make the teeth appear of a different hue and a different brightness when inside and when outside the mouth.

As I stated at the beginning of my paper, it has not been my inten-

prism becomes refracted toward its base, producing on a distant screen a vertical, rounded band no longer white, but showing all of the hues of the rainbow. This is called the solar spectrum. What has happened is this: the white ray has been broken up into its elemental hues—red, orange, yellow, green, blue, violet. It is interesting to note at this point that here is the only place in nature where we get pure hues. The hues of the landscape, for example, are always modified by a mixture of white or gray light.

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[7]Page 67, Dr. Clapp's Chapter on Color.

colored flowers. As darkness gathers, the colors gradually disappear, even though the shapes of the flowers may be distinctly seen. The photograph illustrates the same thing. The hue here is left out, only degrees of brightness being noticed. In matching the teeth, therefore, the kind and amount of illumination under which they are seen has to be considered. Let me explain this matter more in detail. The natural teeth, because of their position in the mouth, surrounded as they are by the shadow of the lips, and back of them the more or less dark, oral cavity, will be under a very different illumination from the artificial tooth held in the hand or tweezers, or in front of the patient. In order to be sure that the artificial tooth will match in color the natural teeth, it is best to defer the selection of the tooth until the tooth to be crowned is ground off sufficiently to allow the facing to be placed in the exact position it is to occupy permanently.

Now, we must take into account one other thing in order to match our teeth successfully. If we look for some time at a red, and then look at a colorless wall or a piece of paper, we find that a greenish tinge is given to the colorless wall or paper. Similarly, if we do the same thing with a greenish object, we find it to be followed by a reddish tinge. Again, if we look for a time upon a yellow object, and then focus on a colorless ground the latter takes on a bluish tinge. Similarly, the blue is followed by a yellowish tinge. This is the phenomenon of *negative after-images*. Again, if I place a yellow and a blue alongside of each other, the yellow will appear "yellower." (i.e., more saturated) and the blue will appear "more" blue, at the line of junction. If I place a green alongside of a red, the green and red will each appear more saturated at the line of junction. This is called *simultaneous contrast*. Again, if I look from a yellow to a blue object, the latter will appear "more" blue, i.e., more highly saturated, than before. The same holds of the relationship of red and green. This is called *successive contrast*.

These things must be taken into account and guarded against if we would make successful matches of color. A bright object appears brighter when put alongside of a darker one, and vice versa. And just as the object that is placed alongside of the red takes on a greenish tinge, so the human teeth appear greenish when seen surrounded by the healthy red tissues of mouth and lips. Thus teeth that in themselves are of a decidedly orange hue, will often appear greenish yellow, as a result of their being surrounded by very red tissues. In short, the factor of negative after-images and simultaneous and successive contrast tend to make the teeth appear of a different hue and a different brightness when inside and when outside the mouth.

As I stated at the beginning of my paper, it has not been my inten-

tion to formulate here a course of study which will give us the right to consider crown and bridge work among the fine arts. I have merely endeavored to indicate a few factors which enter into securing artificial teeth that shall be a real imitation of nature. The requisites of prime importance for the individual dentist are: to be fully informed on color; to train his powers of color-discrimination, and thoroughly to understand all of the elements which enter into a modification of the color of the teeth. —*The Dental Summary.*

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SOME REFLECTIONS, APPRECIATIONS, AND CRITICISMS ON THE FOREGOING PAPER OF DR. ORTON

By J. Leon Williams, D.D.S., L.D.S.

INTRODUCTION

Somewhere, sometime, away back in the abysmal depths of past time the animal ancestor of man assumed the erect position, thus freeing his hands for a great variety of new uses. The ever increasing use of the hands, after the upright position had become established, undoubtedly was the most important factor in the evolution of human intelligence and that ascendancy over all other forms of life which the human species rapidly achieved. All of the foremost educational institutions of the world are more and more coming to realize the importance of the use of the hands as an aid and stimulus to brain development and the growth of intelligence. In the interaction of hand and brain and the reaction of the one on the other lies every possibility of future human evolution, and in this future evolution of man those activities which we designate under the general term, art, will play an ever increasing importance. And the reason for this is that art is the supreme achievement of industry, or, in the words of Prof. Denman Waldo Ross, lecturer on the Theory of Design, of Harvard University: "Industry means doing things; Art means doing them particularly well."

The future greatness of this country and of every other country in the world depends entirely on the extent to which that statement is appreciated and understood. The future greatness of any profession and of every individual in every profession and calling also depends entirely on the extent to which that great, fundamental truth is appreciated, understood, and carried into effect. The chief trouble with the world to-day, one might almost say the only trouble, is the lack of a great passion for "doing things particularly well." As one moves up and down this country to-day and comes in contact with a great variety of activities, one cannot help being convinced that the ruling question with many is "how cheaply can I do this work and 'put it across' and get my money for it," and the only part which art plays in such work is the art of making a thing *appear* to be that which it is not, of "dolling up" a thoroughly inferior product until it has the superficial appearance of being done particularly well.

Because these fundamental things apply to dentistry just as they do to any other calling, and because Dr. Orton stands as one of the few who are always urging a realization of Prof. Ross' definition of the difference

between industry and art, I am going to dwell a little more at length on these fundamental things in this review of his paper.

When fundamentals are clearly stated and accepted the way is open for the avoidance of mistakes and advance in the right direction.

Every normal human being desires to be successful and happy. I deliberately associate these two conditions of life because happiness is the direct and inevitable result of success, when that term is rightly understood and realized. Let me, then, present a definition of success of which happiness is the natural result.

SUCCESS: *The fullest possible development and expression of all those powers and faculties in the individual which contribute to his own real welfare and the welfare of humanity.*

That definition, you will see, covers not only all possible individual achievement but the relation of that achievement to all other individuals. It holds the sum and content of all ethics. And in that activity and in that relation lies all human success and the source of all happiness. No individual can be completely successful or completely happy when he is not giving expression to the best that is in him, and *no man is in ethical relationship to his fellows when he is doing less than his best.*

If these propositions are true it is a matter of vital importance for the individual to seek "the fullest possible development and expression of all those forms which contribute to his own real welfare and the welfare of humanity." There is just one way, one way only, in which these great things of success and happiness can be fully achieved and realized. It is a single and simple rule of conduct. *Let no task or piece of work pass from your hands until you have performed the task, until you have finished that work to the best of your ability.*

The reactionary effects on human development of that rule of life in one's work is beyond all computation. The deep satisfaction of work well done is in itself one of the chief sources of human happiness. And the reactionary effects of this sort of work are not confined to our mental, moral or spiritual faculties. It also profoundly affects our physical bodily functions and qualities.

The state of mental exaltation growing out of the consciousness that we have done our level best is one of the greatest promoters of health and general physical well-being.

To begin each day's work with the intention and firm determination to do that work a little better than you have ever done it before is to put every nerve fibre of the body and every nerve cell of the brain in the path of development and progress. And there is no other way of accomplishing this great end. In the measure of the exercise of power is to be found the index of its increase. The fatal mistake that the vast

majority make is in estimating their own powers too cheaply, in always holding the thought that they cannot reach the heights that others have won. Individuals vary in their capacity for development, but there is no normal human being who may not profoundly astonish himself at the progress he has made in a single year by laying out all his time in a systematic manner—so much for the regular day's work, so much for reading and study, and so much for recreation, and then doing everything connected with these several groups of activities to the fullest reach of his ability. He will have no need to ask any one to show him the way to success and happiness—he will have found the royal road.

To do one's work in the best possible manner is to constantly exalt it, and to exalt one's work is to exalt one's self. Drudgery is largely a mental attitude, a debasing, degrading mental attitude. It can be banished by a constant study of how to do the simplest things with the greatest possible art. It is of course perfectly easy to present instances in ridicule of these statements. But nothing has ever escaped the ridicule of those who find greater delight in tearing down than in building up, more satisfaction in discouraging than in encouraging their fellows.

In this critical time of the world's history we frequently hear it said of men who are trying to lay the foundations for a better civilization that they are idealists. And the term is used in reproach. The only comment called for is that God alone knows if there would be any sort of a civilization on earth to-day if there had not been great idealists in the past who endured the same taunts that blind, faithless reactionism is flinging out to-day.

Let me, then, emphasize this fact: If the experience of nearly fifty years of professional work has taught me anything, it has demonstrated that the only path of development and progress is that in which the highest possible perfection of work is aimed at, and in which the greatest possible effort is made to reach the ideal formed in the mind as the aim. And I cannot attribute a single failure of my own to any other cause than non-observance of these principles.

These are some of the reflections that followed the reading of Dr. Orton's stimulating and thought-provoking paper, and now let me come to some of the details in this paper which seem to me to call for comment and criticism.

On going over this article carefully I find the following salient points to which I wish to call attention:

(1) *Definition of art in relation to dental prosthesis.*

(2) *To what extent should the manufacturer be expected to supply teeth made in the most exact imitation of nature that it is possible to produce?*

(3) *On the nature of color in natural teeth and its imitation in artificial teeth.*

(4) *On the standardizing of the color of teeth by the classification of people into types and classes.*

(5) *On the modification of color in artificial teeth by surface markings.*

(6) *Apparent changes in color due to contrast and nerve exhaustion.*

(1) *Definition of art in relation to dental prosthesis.*

Dr. Orton finds the most appropriate definition in the old epigram: "True art is to conceal art." But he is careful to state that this definition applies especially to crown and bridge work and that it expresses the limitations of imitative art. In most cases of crown and bridge work we have to match natural teeth with artificial ones as perfectly as we can. We have to copy all the peculiarities, defects, and so-called "accidents of nature" to the best of our ability. But we should never lose sight of the fact that imitative art is not considered a high form of art, and that the moment we find ourselves free from the arbitrary demands of nature's imperfections we are bound to endeavor to utilize the principles of a more exact science and a higher art. When we are forced to match natural teeth we may find ourselves obliged to conform to various defects and disharmonies of nature. We may have to insert a tooth of the tapering or second-class form in a square face, or a square tooth of the first class in an ovoid face. We are bound to the wheel of nature's defects and mistakes, we are confined to a purely imitative art and cannot help ourselves. But when the natural teeth are all lost we are free to follow the teaching of a scientific classification and the principles of a higher form of art than that of mere imitation—the art in which harmony of tooth form to face form is the first essential. It cannot be too often repeated that nature rarely achieves perfect harmony in any of her work. As Ernest Garett in his recent very able work on "Art Principles" says: "Nature never produces a perfect form without a perfect countenance . . . but it is within the power of art to correct the work of nature in these respects."

And again: "In the case of a fully developed animal when the posi-

tion of parts is fixed, a type may be conceived which is superior in symmetry and harmony to any individual of the species produced by nature."

It is the duty of the dentist to make himself fully acquainted with the principles of harmony which exist between tooth form and face form and to give his patients the benefit of his knowledge. He will find the study leading to this knowledge most fascinating, and in the application of this higher form of art in dental prosthesis he will experience an ever increasing delight to himself and an ever growing esteem and appreciation on the part of his patients. One of the great rewards of doing the best that we can in our work is an ever growing interest in and love of the work itself.

(2) *To what extent should the manufacturer be expected to supply teeth made in the most exact imitation of nature that it is possible to produce?*

Dr. Orton, in considering this phase of his subject says: "I believe that we have a right to demand that the manufacturer furnish us with teeth which show all the peculiarities of age." And he further specifies some of the peculiarities such as "abrasion, erosion, and even atrophied enamel formation," which I infer he would have the manufacturer imitate in the teeth which he offers the profession.

Let us see just how this proposition would work out practically. Dr. Orton very truly says that we should go to nature and study her very carefully. We cannot do too much of that for it is the basis of all art as of all other forms of knowledge. Let us suppose, then, that the manufacturer makes a most exhaustive study of, I will not say all of the defects and peculiarities of natural teeth, for that would obviously be impossible, but of a wide range of these "accidents of nature" in form, markings, and stainings.

The number of these markings is, as I have intimated, infinite or indefinite. They are not alike in any two mouths. They vary in the individual teeth in any given mouth. The stock required to produce any considerable fraction of the vast number of these variations as found in nature would be far beyond the capacity of any retail dealer to handle. But if such a stock could be accumulated it is highly probable that a dentist might spend a whole day in going over such a stock without finding a suitable match for the defects, special markings, stainings or other peculiarities of the case in hand.

A limited number of sets of teeth of this character might be supplied for full cases, but obviously, it would be completely impracticable for the manufacturer to attempt to produce a stock of such teeth for crowns, bridge work facings, or partial cases of plate work where natural teeth have

to be matched. In all work of this sort the utmost that the manufacturer can do is to supply standard forms conforming to types and the most common modifications of types, in suitable colors. On this foundation the dental artist must produce the particular effects he desires for any given individual case.

(3) *On the nature of color in natural teeth and its imitation in artificial teeth.*

In the last analysis all color is due to structure, to the molecular arrangement of matter. But our perception of color as it appears, for illustration, in the great variety of tints seen in the clouds of an evening sky, and a similar variety of tints or hues observed in fabrics displayed in a shop window is due to widely different conditions. In the first instance our perception of color is due to phenomena closely akin to spectrum analysis; in the second to pigments which absorb certain colored rays of light and reflect others.

These two exhibitions of color phenomena have a direct bearing on the problem of producing color in artificial teeth in imitation of natural teeth. Color in porcelain teeth must be produced by mineral pigments.

The appearance of color in natural teeth is probably due to physiological and structural conditions in which pigmentary deposits play little or no part.

In a paper which I read some six years ago before the First District Dental Society of New York, I called attention to the Lovibond method of color analysis and its possible application to the determination of color in natural teeth. Subsequently Dr. G. W. Clapp went to England and spent some time in the Lovibond Laboratory, where with the assistance of experts the colors in several sets of teeth were analyzed. But as this method of color analysis is akin to that of spectrum analysis, and as the primary colors of the spectrum cannot be used as the basis of coloration with pigments, the knowledge gained by this system of analysis does not get us forward much. And the reason is, as I have intimated, that when we begin experimenting in the coloration of porcelain we are unable to make use of those colors and tints which we used in our methods of analysis. We have to gain a new kind of knowledge which is quite independent of that obtained by our methods of analyzing.

I am in complete agreement with Dr. Orton that the methods at present in use in the coloration of artificial teeth should be revolutionized, and I have no doubt that effects in much closer resemblance to nature can and will soon be obtained and that the scale of color will be far simpler than that now in use.

I am inclined to agree with Dr. Orton as to the principal basis of color in natural teeth, but I have to admit that our present opinions are largely the result of scientific speculation.

A large amount of experimental work must be conducted in this field before we shall find ourselves on solid ground.

(4) *On the standardizing of the color of teeth by the classification of people into types and classes.*

I believe this can be done and that it will be done in the near future. And I believe that the possibility for advance in the improvement in the colors of artificial teeth, based on the ascertained colors of natural teeth described by scientific nomenclature, are as great as were the possibilities for improvement in form ten years ago. I have said that scientific methods of color analysis can help us but very little in perfecting a color scheme for artificial teeth, because that color scheme must be perfected entirely by experimental methods which have scarcely anything in common with the scientific procedure of color analysis. But before we can know what we want for color in artificial teeth we must first know what the colors are in natural teeth, and I have no doubt these essential primary facts can be ascertained by systems of color analysis now in use. These facts once in hand there must follow a long series of experiments with the few mineral colors available in the effort to match the colors we have found in the natural teeth. The crux of this whole difficult problem lies in the perfecting of a set of color symbols which will at once and at the same time stand for the color of natural teeth as expressed by the results of a system of color analysis, analogous to spectrum analysis, and the results of a purely empirical or experimental method with mineral pigments. This is not an easy matter, but I believe the thing can be done. It must be done if we are to achieve entirely satisfactory results, and I hope Dr. Orton will be able to work out a set of symbols which will help us to accomplish this great advance.

(5) *On the modification of color in artificial teeth by surface markings.*

I have said that in the last analysis our perception of color is due to the molecular structure of the object reflecting the color. But this color is somewhat modified by the nature of the surface. The more highly polished the surface the stronger the tendency for the color to pass into higher or lighter tints and for surrounding colors to be reflected from this highly polished surface.

But the interior structure and the surface of a natural tooth can only be perfectly seen and thoroughly understood by the aid of the microscope. This microscopic structural condition influences the color as we see it. But it is quite impossible to imitate this interior or surface structure in porcelain. We therefore have to call art to our aid and endeavor, by various means, to produce such a surface on our porcelain tooth as will give the same color and structural *appearance*, to the eye, at a little distance, as we see in the natural tooth. The polished surface of the natural tooth must be modified in some way so that the rays of light will be dispersed and the purely reflecting surface obliterated.

(6) *Apparent changes in color due to contrast and nerve exhaustion.*

Dr. Orton has treated this phase of his subject in a very thorough and scientific manner, and the only added suggestion I have to make is that the dentist, when engaged in matching the color of teeth, should have close at hand some bright blue object to which his eyes may be turned every few moments to neutralize the color exhaustion effects of prolonged gazing at the yellow of the teeth.

The best work treating this subject that I have found is "Color in Everyday Life," by Prof. Louis Weinberg, and published by Moffit, Yard and Co., of New York.

If every dentist who reads this would order that book (price $2.50) I am sure he will thank me many times for calling his attention to it. Art enters into our work to such an extent, as Dr. Orton has so forcibly pointed out, that every dentist should make himself familiar with the general principles and practical application of all art matters that concerns his work.

Philip Gibbs, the famous war correspondent who is returning to England after a two months' lecturing tour in this country, has just published his farewell message to the American people in the New York *Times*. It is an arresting and noteworthy communication. He tells us that he is convinced we are at heart a people with high ideals. And he tells us that the hour of our destiny has struck, that our supreme moment is at hand, that we are summoned "to the highest place in the world's democracies." I believe this to be an utterance of the most momentous truth we have ever faced. And in this great privilege of holding up ideals to the world each and every one of us has his opportunity and what should be his willing and glad duty. American dentistry has, during the war just ended, added much to the high reputation it has long held. There is greater work for the future. The standard of any profession is deter-

mined not by the work of a few but by the general level of accomplishments and ideals of the majority.

Dentistry, because its demands enforce an intimate relation between the work of the hands and the action of the brain, is an occupation that should greatly foster individual development. And it will always do this if high ideals are constantly kept before the mind.

Dr. Orton quotes the remark of a prominent manufacturer of artificial teeth who said: "When the dental profession knows what it wants, we will supply the demand." I do not know who said that but I do wish that the words could be printed in letters large enough to be read at a distance of a hundred feet and hung up in every place where dental organizations meet. The dental manufacturer may never be entirely actuated by philanthropic motives (how many professional men are?) but he is wise enough to know that his success as a business man depends upon his keeping abreast of concerted demand.

In the past the dental profession has sometimes been *led* by the manufacturer. Let us hope that time is permanently in the past.

The great new idea, which is but the revival of a very old idea, now at the front in the minds of all progressive men is coöperation—working together, all working for the benefit of all.

The leading dental manufacturers stand ready to coöperate with the profession in all endeavors to realize the highest ideals.

And there is no way by means of which we can realize our ideals in many directions except by intelligent coöperation with the manufacturer. Dr. Orton has pointed out an advanced step which should be taken immediately. If he is supported in his demands by any considerable body of men in the profession his demands will be met, the work will be done.

DO PORCELAIN CROWNS MEET THE REQUIREMENTS OF PRACTICE?

By George Wood Clapp, D.D.S., New York

SECOND PAPER

The preceding paper summarized the information that porcelain crowns which are to meet the best standards of service should be like at least the most frequently seen forms of natural teeth, and should be in graded sizes, shaded in the set; that the crowns now obtainable are conventionalities of tapering and square forms; that this condition exists because the dental profession has never presented correct detailed specifications to the manufacturers, and that Dr. Williams has now assembled the information necessary to the production of proper forms and sizes in artificial crowns.

This paper presents the story of the conventional forms in crowns and a brief description of what is required in crown forms, meaning the outline form of the crown as seen when one looks directly at the labial surface. All reference to size and neck forms are deferred for future papers.

It may be thought that we might well be spared the story of the present forms, but there are two reasons why we should briefly review it. One is that the use of the present forms has gone far to dull our perception of fine tooth forms, and the other is that if we are to have improved forms in crowns we should know in what the improvements consist and how best to employ them.

CHARGES AGAINST THE PRESENT FORMS

It is charged against the present forms that they are conventionalities of only a few forms in the square and tapering types; that, as they come, they match only a few teeth and those not the most pleasing; that they can be ground to match many frequently seen forms in natural teeth only by the exercise of a degree of skill which the average dentist has not yet developed and an expenditure of time which the average patient cannot afford; and that it is impracticable or impossible to match some of the finest natural teeth by such grinding. Equally definite charges against the sizes of crowns, the neck sizes and proportions and the present methods of selection will be brought in future papers.

WHAT IS MEANT BY "CONVENTIONAL FORMS"

The Standard dictionary defines the act of conventionalizing a form as "simplifying it according to artistic principles." Some one has said, "It is making a thing pretty."

Conventionalization through simplification of the elements is common in manufactured articles and decorative designs and is often very effective. Greek borders, vases and architecture are beautiful in their places. But nothing that grows presents a conventional form and nothing that grows can be reproduced by a conventional form. In roses there is a general pattern by which they are recognized and varieties classified. But two roses on the same stem differ sufficiently in minute detail to maintain individuality. A bouquet of artificial roses in conventional forms might exhibit great manual skill and much beauty, but it would not reproduce a bouquet of natural roses.

Natural teeth manifest the likenesses and differences common to all natural objects. Natural anterior teeth are capable of classification into a comparatively few forms which are similar in the general parallelism or convergence of the approximal surfaces, the straightness or convexity of these surfaces and the proportions of vertical length to horizontal width. But teeth which are similar in all these respects present small differences which, without affecting the classification, give individuality to each tooth and are often beautiful.

HOW A TOOTH FORM MAY BE CONVENTIONALIZED

It is one of the easiest of deeds for him who knows no scientific classification of tooth forms, and who does not know what are the major and what the minor characteristics of such forms to regard the minor characteristics as defects and to seek to correct them into straight lines or sweeping curves and so arrive at a conventional form. To the untrained conception the conventional form may be finer than the natural form. Figure 2 is a drawing by Dr. Williams, showing how a form may be conventionalized.

HOW THE CROWNS CAME TO BE CONVENTIONALIZED

The conventional forms resulted from a lack of a scientific classification of tooth forms, and from a procedure which should never have occurred.

The temperamental theory presented each individual as one of 10,000 possible mixtures of four temperaments, and inferred that each individual exhibited a tooth form characteristic of his personal formula. No one can classify 10,000 forms of upper central incisors, and the ideas of even

the best informed men concerning tooth forms are now known to have been inexact, confused, and unscientific.

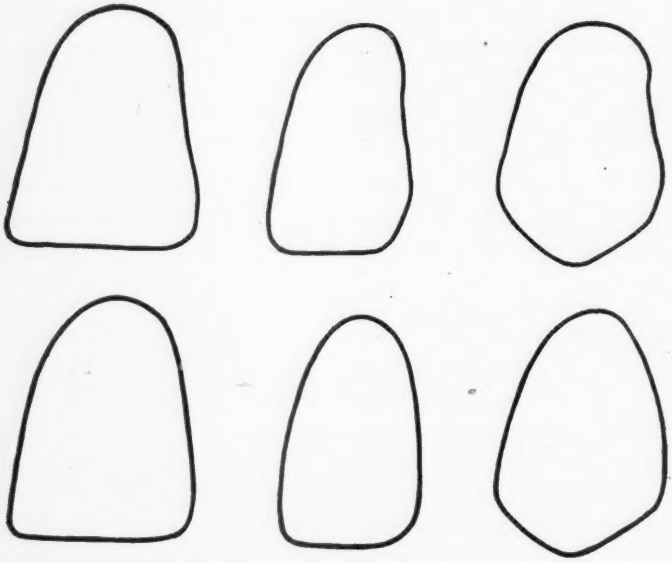

Fig. 2

A drawing made by Dr. Williams to show how tooth outlines may be conventionalized by slight changes in the boundary curves. The upper drawings represent outlines of fine natural teeth. The lower drawings show the same proportions with the curves conventionalized. It might easily be that to the untrained eye the lower forms would appear the finer, and that the mechanic would think the production of forms thus "corrected" a decided advance. If one tries to picture his success in matching teeth from the upper row with crowns from the lower row, he will be able to correctly measure the "advance."

The incorrect procedure lay in the fact that the pattern teeth from which the crowns are shaped were carved by mechanics who were not dentists and were not closely enough supervised by well informed dentists. As most of the forms now used were produced nearly 50 years ago, and have not been improved in principle since that time, they represent what mechanics of many years ago thought the dentists ought to use. The range of forms which has resulted from 50 years of such effort is fairly well shown in Figure 3.

Let any blame which attaches to this procedure be correctly placed. It is unthinkable that the manufacturers, whose proper office is production and sales, should acquire the extensive and minute technical information essential to the production of proper crown forms. Dr. Williams and the writer have spent three years of nearly continuous work in as-

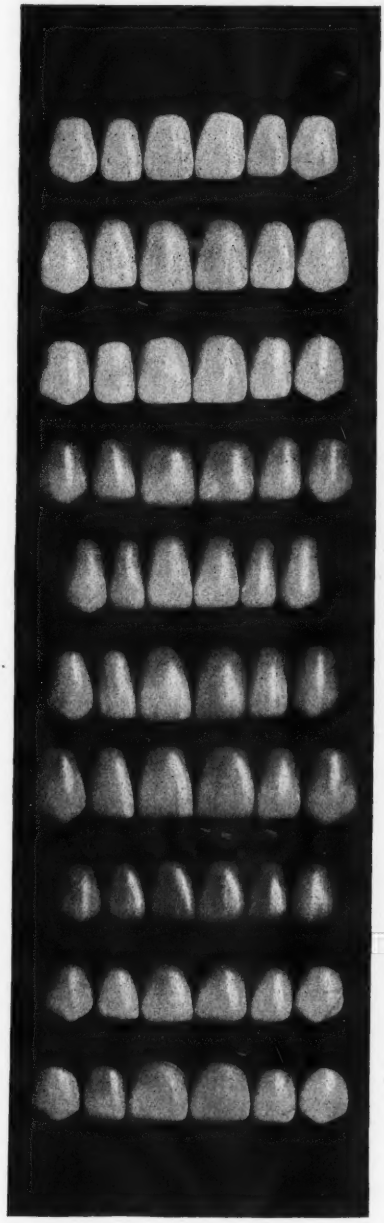

Fig. 3

sembling this information, and it would have been impossible then but for ten years of previous work in connection with tooth forms. In any article which is to become an element of professional service, some properly representative body in the dental profession should determine exactly what is required, should hand the manufacturers specifications, and should purchase only articles suited to achieve the sought-for end.

Those manufacturers who followed the pioneers, seeing certain moulds of crowns as purchased in large numbers by the profession, and hearing no constructive criticism, merely copied the popular moulds. Figure 4 is made up of crowns from the leading manufacturers and shows the extent of this copying.

Bewildered by the chaos of crown forms and sizes, the profession has "settled down" very largely to the purchase of the crowns shown in Figure 5. These crowns appear to the casual glance to offer 11 forms, but closer in-

◀ The crowns shown here represent fairly well the forms which have resulted from 50 years of unintelligent crown form production. The four upper moulds are conventionalizations of the square type, and differ mostly in proportion. The six lower moulds are conventionalizations of the tapering type. The first three of these six differ in labial proportions from each other and from the lower three.

In studying these moulds, it should be noted that while they offer different proportions they do not offer sizes of the same form. If, for instance, one should select the third mould from the top and desire a larger or smaller size of the same form, it cannot be had. Each mould is a law unto itself.

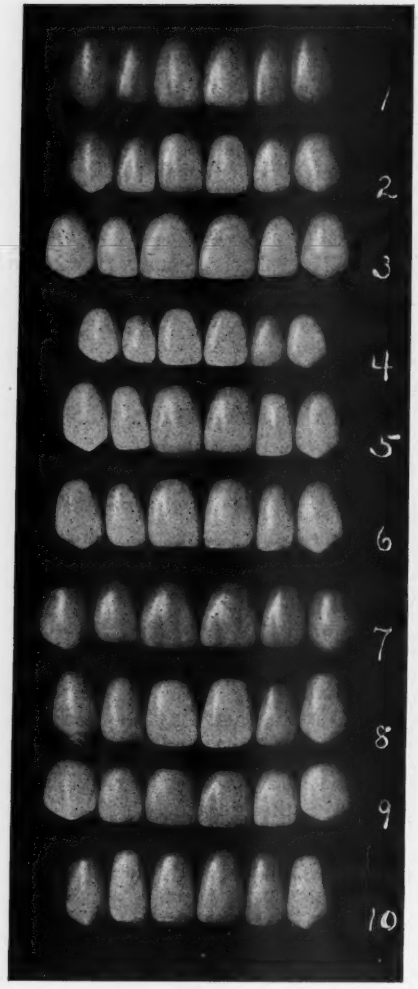

Fig. 4

These ten sets of crowns show the extent of the copying of conventional crown forms. Each set is made of crowns from at least two manufacturers, and in most cases, from three. Except for differences in porcelain texture and colors, the set appears about as well as if all the crowns were of one make.

spection shows that all these moulds are conventionalizations of the tapering type, that Moulds 1, 2, 3, 6, 10, are practically identical in outline form and that Moulds 4, 5, 7, 8, 9 and 11 differ from the others only in that they are longer in proportion to width. These moulds are taken from the stocks of several leading manufacturers, and while the number of popular moulds could be greatly extended, these are generally regarded as the "best sellers."

THE BASIS FOR PRODUCING CORRECTLY FORMED CROWNS

The only basis on which correct crown forms can be produced is a scientific classification of natural tooth forms. The classification offered by Dr. Williams in 1914 has never been disproved and experience has tended only to confirm it. Rather fantastic efforts are sometimes made to show that this classification is, after all, not so very different from the temperamental classification, but the most persistent of such efforts have had a personal reason behind them and are unsupported by scientific evidence.

The only basis on which the dentist can most quickly and accurately select crown forms which permit him to make indistinguishable restorations with the expenditure of a moderate amount of time and effort, is to learn the classification of

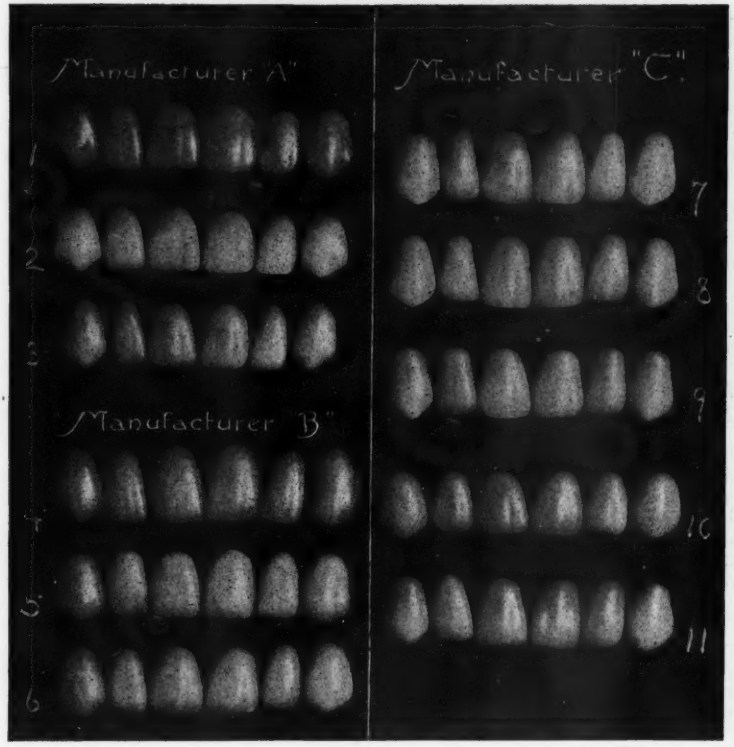

Fig. 5

Perhaps seven eighths of the crowns used are supplied by the manufacturers whose "best sellers" are here represented. These crowns appear to offer 11 forms, but they are all conventionalizations of the tapering type and differ principally in the fact that Nos. 4-5-7-8-9-11 are longer in proportion to width than the others. Close examination shows that there are fewer forms and fewer proportions in conventional crowns than have been supposed.

natural tooth forms so that he may recognize the form of the remaining natural teeth and know at once what crown form is indicated.

In cases where any of the natural upper centrals or laterals remain with the form unimpaired, correct technic indicates that the crowns should harmonize in form with these. If all the upper anteriors are to be set as crowns, the crown form should harmonize with the face, as when a denture is made.

WHAT FORMS ARE MOST NECESSARY IN CROWNS?

Evidently those most frequently seen in natural teeth. These are believed to be the first four forms of the square type (the long square, the

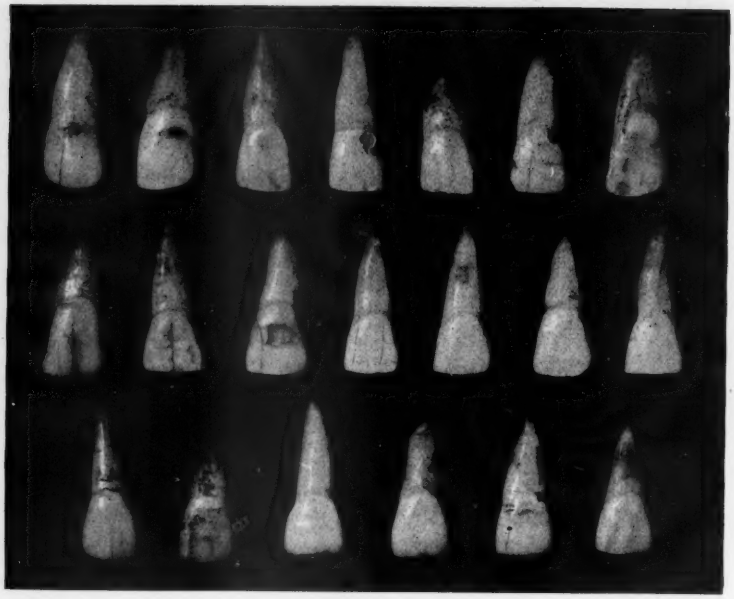

Fig. 6

The upper row shows natural upper centrals of the square type. The approximal surfaces are generally parallel for a considerable distance upward from the incisal edge, the approximal curves are flat and the necks are relatively wide.

The second row shows natural upper centrals of the tapering type. The approximal surfaces are nearly straight and are much more divergent downward than in the square type. The necks are consequently narrower in proportion to the width of the crown than in the square type.

The third row shows natural upper centrals of the ovoid type. The approximal surfaces are more rounding than in the other types and there is a very pleasing, faint double curve on the distal surface, which it is nearly impossible to show by printing. This type of tooth appears never to have been recognized by the designers of the conventional crowns.

The number of teeth expressing the typal forms so clearly as do these is relatively small, most teeth presenting the characteristics of two types, but always with one type dominant.

medium square, the short square, and the intermediate square); three forms in the tapering type (the typal tapering, the fifth tapering and a long tapering which, while not so often seen as some others is often needed and cannot be made from them), and the first and second forms in the ovoid type. Study drawings of upper centrals of a few of these forms, as made from natural teeth by Dr. Williams during the investigations, are shown in Figure 8.

CONVENTIONALIZATION IN LATERAL CROWNS

The conventionalization of forms is greater in the lateral crowns than in the centrals. It has resulted from a complete failure on the part of

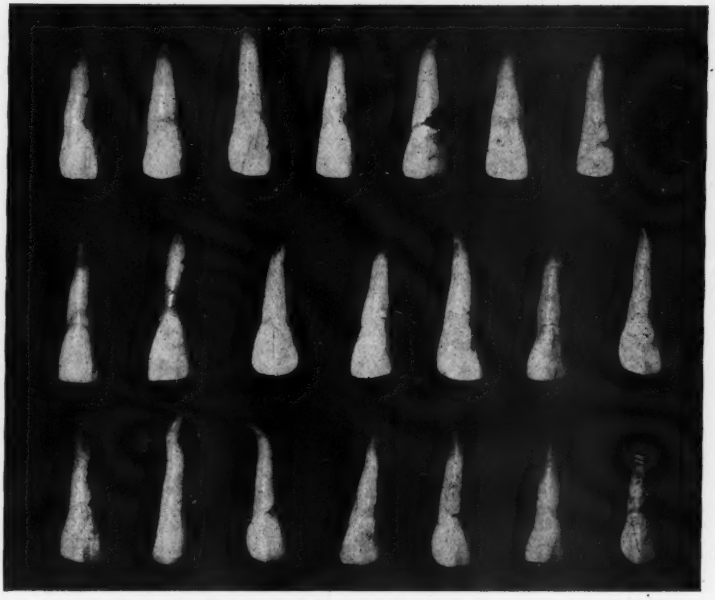

Fig. 7

It is of the utmost importance to the crown worker to realize that upper laterals exhibit the characters of the three types quite as clearly as do the centrals, but that exhibition is different because the position of the laterals and their function is different.

The upper row shows laterals of the square type. They are generally rectangular in appearance, especially the first, second and fourth crowns in the row, from the left.

The second row shows laterals of the tapering type. The tapering character is plainly seen and all these forms are frequently met in practice. One of the criticisms of the conventional laterals is that they do not offer forms similar to these.

The ovoid laterals in the lowest row show the rounding outlines, but not the faint double curve on the approximal surfaces which distinguish and beautify these teeth.

those who carved the original pattern teeth to understand the rôle which the natural laterals play in the esthetics of the mouth. We know this part now, and an understanding of it is sufficiently important to every dentist to justify a paragraph or two.

The upper centrals present the largest labial surfaces found among the anterior teeth. Nature places two of them, practically alike in form, side by side in the median line and turns their labial surfaces most nearly straight forward. This is the only instance in the face where two organs are placed side by side. If additional teeth of the same general form were placed beside these, the result would be monotonous.

The natural upper laterals are unlike the centrals of the same general form. Disregarding here all questions of size and proportions, the in-

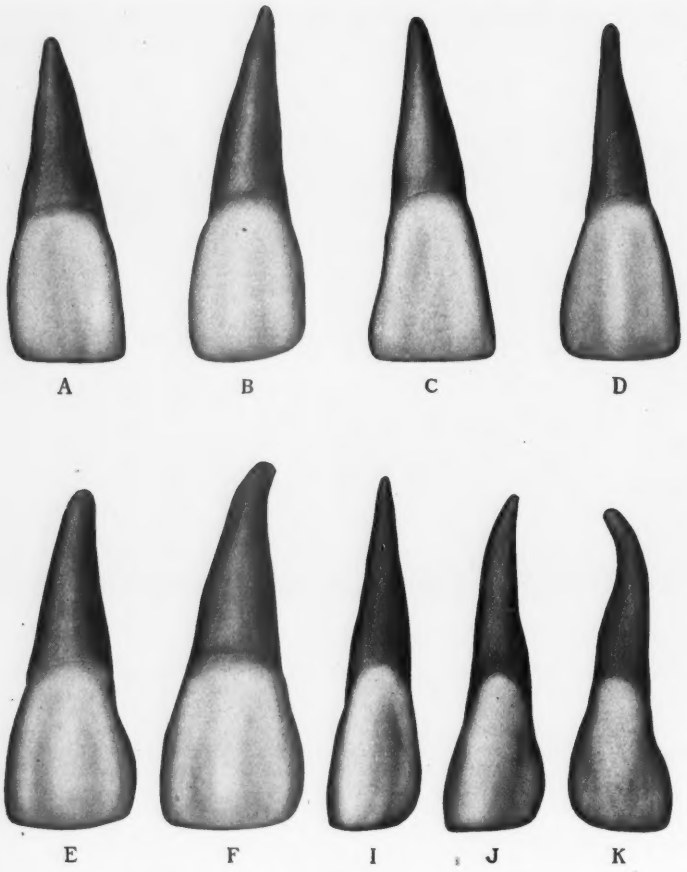

Fig. 8

Reproductions of a few drawings made by Dr. Williams from representative natural teeth, during the studies of recent years. Teeth "A" and "B" are of the square type. "C" and "D" are of the tapering type. "E" and "F" are of the ovoid type. "I" "J" and "K" are upper laterals of the three types. These may be contrasted with the teeth shown in Figures 3, 4, and 5.

clinations and curvature of the approximal and labial surfaces are different. The result is that the laterals relieve the monotony which would result from the presence of more centrals in the row, and without departing from the type or form in the type, they lend diversity and beauty.

An examination of Figure 3 shows that these facts must have been unknown to the carvers of the conventional crowns. The laterals are merely narrow centrals. If one could press the approximal surfaces of

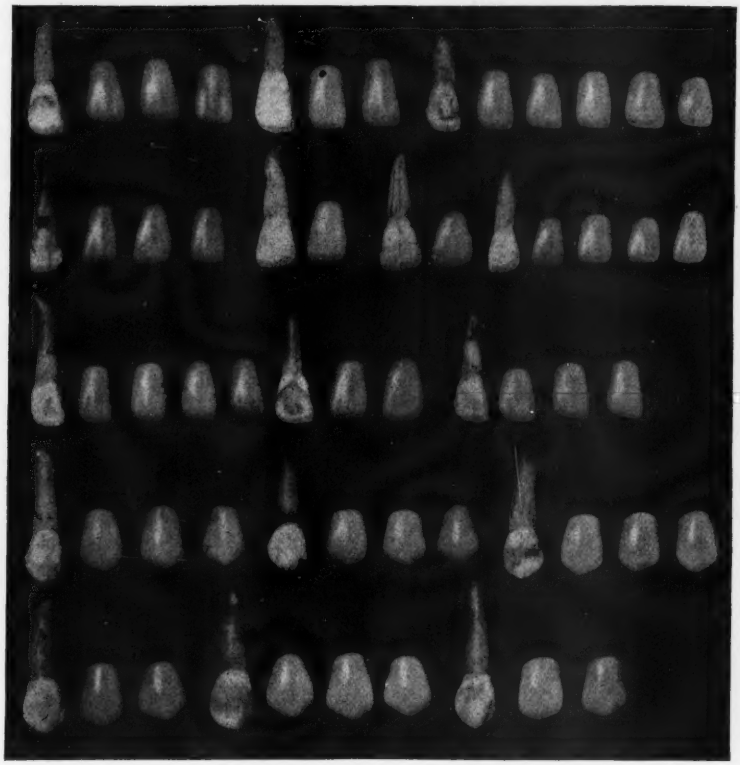

Fig. 9

The conventionality of the porcelain crowns is more marked in the laterals and cuspids than in the centrals, and more grinding for reconstruction will be required. Especial attention is called to the laterals on the left and right of the third row from the top and the extent of the reconstruction which would be necessary. Attention is also called to the cuspids in the fourth row.

No effort has been made to select unusual forms of natural teeth or such as would require more skill than the ordinary restoration in practice. Any of these teeth, or all of them, may be regularly encountered in any practice, together with some of finer and more delicate outline forms.

one of these centrals together, one of these laterals would result. This similarity of form results in an unpleasing monotony in the mouth, even though the cause be not recognized.

An examination of Figure 9, in which part of Figure 1 is shown again, shows some of the conventional forms beside a few frequently seen natural lateral forms. Is it any wonder that if one natural lateral be in place and the dentist sets one lateral of conventional form, the result is rarely satisfactory to patient or dentist?

Porcelain crowns, which are to conform to the standard of service set in the first article of this series—and with which the dentists, by the exercise of a moderate amount of skill and effort, shall be able to make restorations indistinguishable to casual inspection—must present laterals with the characteristics of natural laterals. In most cases it will then be necessary only for the dentist to make the minor modifications required for the individual case.

CONVENTIONALIZATION OF CUSPID CROWNS

Conventionalization of crown forms reaches its summit in the upper cuspids. In many cases the approximal surfaces are merely the approximal surfaces of the upper centrals with the teeth pointed and the labial surface made more bulging at the neck.

In Figure 9 the conventional cuspids are the narrowest that will permit the dentist to grind a duplicate of the natural cuspid. The lengths were the best obtainable in these widths in the most extensive line of crowns now before the profession. A little study of the curvature in the natural cuspids shows that it will require a high order of artistic perception and skill, and the expenditure of much time to make a cuspid restoration which compares favorably with a natural cuspid which may remain on the other side.

The next article will take up the question of sizes and proportions of crowns.

MY WAR GARDEN

By W. Henry Menmuir, L.D.S., F.R.S.G.S.

THIRD PRIZE, WAR GARDEN CONTEST

I may say that I am a Scotch dentist in practice in the West End of Edinburgh. I have enjoyed gardening for a number of years. It is the ideal hobby for the Dental Surgeon. Two years ago I became tenant of an old house with an enclosed garden of about half an acre. It is only eight minutes' walk from my residence, which is very fortunate as I spend most of my mornings and evenings in my pretty retreat. The situation is exquisite for a city garden, for a short distance from my boundary wall there are practically trees all round which makes one feel in an enchanted region.

I took to gardening as a grand outdoor hobby, as I have always been like Goethe and Petrarch, in love with Nature—in fact everything that is beautiful. It has put me more or less in tune with the Infinite. After a hard day's work in the Surgery—packing foreign matter (as a Theologian told me) into my patients' mouths— it is a fine change to go down to my garden to look at my beehives, and to examine the growing crops around.

From a mental point of view the gardening has been excellent, for the contact with Mother Earth keeps my spirits ever fresh. My friends who helped me in the garden are now doing military duty and I am all, all alone. However, whilst they were with me, during the intervals of delving and planting, we discussed the topics of the day, and during the winter in the old dining room of my garden house we lectured on special subjects to each other before a blazing fire of coal and wood. Last winter I lectured to our little group on "The Mental Functions of the Brain," "Potato Growing," "A Tour in Russia," and "A Sketch of Europe from the 13th Century to the French Revolution." These lectures all came about from having the old house in connection with my garden. So much for the mental aspect.

You ask about the "sentimental returns," and I may say that during this terrible European War I have had the internal satisfaction of knowing that I did my share in raising food for my country. Last year I worked on an average from 20 to 30 hours per week in my garden. Besides growing potatoes, cabbage, turnips, leeks and the other crops common to a garden, I have raised a number of new varieties of potatoes. One variety, the Margaretta, named after my wife, I have grown for five years. It crops and cooks well, and also possesses a fine flavor. There is a great demand in Scotland for new varieties of potatoes, as many varieties

have disappeared on account of wart disease, which has become a plague in the country.

This, then, is my little story about my garden. I hope you will publish it in your journal, apart even from any competition, to let my professional brethren in the New World see what a Scottie is doing in his ain countrie.

3 Lynedoch Place, Edinburgh, Scotland.

WHAT DID I DO TO THIS PATIENT?

By Wm. Curtis Dalbey, D.D.S., Du Quoin, Illinois

A young lady about nineteen years old came to me for the insertion of several fillings. None of the work was difficult. I saw immediately that she was very nervous—remarkably so. Her mother, who was with her, said she had been always delicate. I anticipated trouble and made up my mind that something must be done right on the start or I would be up against it. I hastily examined her teeth with some difficulty. She then partially raised up and sat a little forward in the chair, I gently pushed her back and inclined the chair backward about 45 degrees. I put my left hand gently on her forehead and very lightly smoothed back the hair lying on her forehead. At the same time I said, "Now calm yourself and go to sleep, you will not be hurt." I waved my right hand in a playful way through the air like I had seen a hypnotist do once, laughing as I did so. She smiled and closed her eyes and in a moment I noticed her muscles relax seemingly all over the body. I thought it merely a voluntary relaxation, but when I spoke to her and she did not answer, I gently shook her arm and still no response. I pride myself of keeping a pretty good equilibrium through most ordeals, but I now began to think my patient's nervousness had been transmitted to myself. After trying several times to bring her to consciousness I lowered her to a lying position. The mother came forward rather excitedly but as nonchalantly as possible I gave her to understand that this was an everyday occurrence. I told her that her daughter would be all right in a moment, but it was fully five minutes before my patient opened her eyes.

The question is, What did I do to this patient? Did she faint? I do not think so, because instead of paling, as is usual in syncope, the patient's face became slightly flushed. After this episode I finished the operation without the least bit of trouble. I am still wondering what I did to that patient. I do not believe in hypnotism, as applied this way, and certainly I have no such power.

DENTAL LAWS

DENTAL LICENSE REQUIREMENTS IN THE UNITED STATES OF AMERICA

By Alphonso Irwin, D.D.S., Camden, N. J.

Revised April 30, 1919

UNIVERSAL REQUIREMENTS

1. All applicants for a dental license must undergo an examination.
2. All examinations and writings must be in the English language.
3. The applicant must have reached the age of 21 years or over.
4. Possess a good moral character, certified to by two or more licensed ethical dentists, who must be well acquainted with the applicant; under reciprocity the endorsement of two resident freeholders is required.
5. New laws require a four years' course accredited High School education, or its equivalent.
6. All Boards require a Dental Degree from a reputable College, countersigned by the Secretary, Registrar, Dean or Provost.
7. The candidate must present a properly filled out and attested application, accompanied by
8. A recent unmounted cabinet-sized photograph, countersigned by himself, and attested to by the photographer, or by the Dean or Secretary of the College.
9. Credentials must be presented to the Secretary of the Board at least one or two weeks prior to the examinations, including all licenses, if any, in possession of the candidate.
10. The license fee (ranging from $10.00 to $50.00) to be paid by certified check or post-office money-order or cash.

If credentials are accepted, the candidate must present himself at the proper time and place to undergo a practical and theoretical examination before the Board of Examiners upon subjects and tests usually taught in a standard dental college.

Alabama: New law, 1915. Preliminary education, four-year High School diploma or its equivalent, fourteen standard units, dental degree from a reputable dental college. Examination fee $20.00, certificate

$5.00. All applicants examined. Practical requirements: Amalgam, gold and silicate fillings; gold inlay; four-tooth bridge. Meeting, second week of June, in Tuscaloosa or Birmingham, each year. Interchange with Illinois, Kentucky, and Louisiana. Initial Registration with Probate Court in county where practice is conducted, and Board Secretary; fee $1.00.—*Secretary*, A. H. PARKS, 412-414 First National Bank Bldg., Montgomery, Ala.

Arizona: New law, 1913. *Non-graduates not admitted* to examinations, unless they hold a license from another state. All candidates examined, and *dental degree required*. License fee $25.00. October meeting in Phoenix, June in Bisbee. No interchange. Registration with Secretary of State.—*Secretary*, EUGENE MCGUIRE, 202-203 Noll Bldg., Phoenix, Arizona.

Arkansas: New Law, 1915. *Dental diploma required*. All applicants examined. License fee, $15.00. July meeting in Little Rock. Interchange with Illinois, Kansas, Missouri, and Oklahoma. Annual registration with Board Secretary; fee $1.00.—*Secretary*, H. J. GREEN, Paragoula, Arkansas.

California: Amended law, 1915. Accredited High School diploma or State Superintendent's certificate, and dental degree required. No interchange. License fee $25.00. May or June, and December examinations held in San Francisco and Los Angeles. Registration with County Clerk. Usual subjects taught in a standard Dental College. Practical requirements announced at the beginning of each examination. Annual license fee $2.00.—*Secretary*, C. A. HERRICK, 133 Geary Street, San Francisco, Cal.

Colorado: Law amended 1905. Recognized High School certificate and dental degree required. All applicants examined; examinations, practical and theoretical, held during June and December in Denver. Practical requirements: gold and amalgam fillings; Richmond crown; plate with anatomical occlusion. License fee $25.00. No interchange. —*Secretary*, R. C. QUICK, 310 Metropolitan Bldg., Denver, Colorado.

Connecticut: New law, 1917. Dental degree required. Law permits interchange, but none reported. June and December examinations in Hartford. License fee $25.00. Dental Hygienists licensed; fee $5.00. Registration biennial with Recorder; fee $1.00.—*Recorder*, EDWARD EBERLE, 902 Main Street, Hartford, Conn.

Delaware: Law 1917. Requirements: Written notice of application for examination two weeks prior to meeting, accompanied by $25.00. Requirements: insertion of one gold and plastic filling before the examiner, the candidate furnishing everything except an engine; "Also showing Richmond Crown, three or four tooth bridge, partial upper rubber plate," the product of his own work; and diploma from a recognized Dental College, and a late attested photograph of the candidate. Re-examinations granted on same conditions as for a new candidate, including fees. Board meets July 16, 17. Registration with County Clerk (initial) and annual registration with Board Secretary; fee $1.00.—*Secretary-Treasurer*, W. S. P. COOMBS, Middletown, Del.

District of Columbia: Dental degree required. January and June examinations in Washington University. Fee $10.00. Interchange with Iowa, Kansas, Minnesota, Ohio, Oklahoma, West Virginia. Dental hygienists examined and licensed; fee $10.00. Apply to Secretary for Blanks.—*Secretary*, C. A. HAWLEY, 1624 I Street, N. W., Washington, D. C.

Florida: Law of 1911. Dental degree required. June 17, 1919, examinations in Jacksonville. Requirements: Pre-Dental; N. D. A. standard. Practical requirements: gold filling, gold inlay, gold crown; full upper and lower denture in Gysi articulator. No interchange. License fee $25.00.—*Secretary*, R. P. TAYLOR, 414-415 St. James Bldg., Jacksonville, Florida.

Georgia: Law approved 1909. Dental degree required. Examinations usually held during January and June in Atlanta or Brunswick. No interchange. Temporary licenses issued; fee $5.00. Regular license $10.00. Registration with Board of Dental Examiners and County Clerk.—*Secretary*, D. D. ATKINSON, Brunswick, Georgia.

Idaho: 1909, Amended law. Examinations required with or without diploma; five years' practice accepted. January and July examinations held in Boise. Licenses exchanged with Utah. License fee, $25.00. —*Secretary*, A. M. JACOBSON, 255 E. Centre St., Pocatello, Idaho.

Illinois: The Illinois requirements are typical, and with few alterations could apply to nearly all State Dental examinations. Amended law 1919 pending effective July 1st. Diploma from an accredited High School (four years' course) or its equivalent; fifteen units; dental degree required. Theoretical examinations in anaesthesia, anatomy, bacteriology, chem-

istry, embryology, histology, materia medica, metallurgy, operative dentistry, oral surgery, oral hygiene, radiography, pathology, orthodontia, physiology, prosthetic dentistry, therapeutics, in their relation to dentistry.

Practical examinations consist of one gold and one amalgam filling; one gold inlay; one crown. The Board may substitute an additional gold filling or inlay. Applicant must furnish all instruments and materials.

Prosthetic work, plaster casts, also impressions of full upper and lower denture; also bite, occlusion mounted on anatomical articulator and trial plate ready for the mouth; construction of lower molar gold crown is required; the Board may substitute other work.

Biennial registration, fee $1.00. June and November examinations in Chicago.

Points in Grading: Prosthetic—First, treatment of the impression to secure retention; Second, selection and general arrangement of the teeth. Occlusion—Third, contour or restoration of the features.

Crown Grading: First, preparation of the tooth; Second, adaptation of band to root; Third, occlusion form; Fourth, finish.

Examination fee $20.00. Certificate $5.00. Registration $1.00. "Interchange upon certain conditions."—Address, F. C. DODD, Supt., *Registration*, State House, Springfield, Illinois.

Indiana: Law amended 1913. Preliminaries: State superintendent's certificate or college entrance credentials; diploma from a recognized dental college. All applicants examined. June and November examinations in Indianapolis. License fee $20.00. Reciprocity with Illinois, Iowa, Kansas, Kentucky, Michigan, Minnesota, Nebraska, Oklahoma, Pennsylvania, and Vermont, upon the following terms:

"Any applicant who has been in legal and ethical practice in any of the above states for not less than five years, and who is a member of the State Dental Society, and has the recommendation of the Board and Dental Society of his state, may be admitted to our examination at any regular meeting and excused from all theoretic examination, being required to pass the practical tests only." Annual Registration with Board Secretary; fee $1.00.—*Secretary*, H. C. MCKITTRICK, 605 Hume-Mansur Bldg., Indianapolis, Indiana.

Iowa: Law amended, 1904. Graduation from a High School, four years' course, or equivalent; graduation from an accredited Dental College. June and December examinations held in Des Moines or Iowa City. Reciprocity with District of Columbia, Illinois, Indiana, Kansas,

Michigan, Minnesota, Missouri, Nebraska, Ohio, Tennessee, Vermont, and Wisconsin. License fee $20.00. Practical work consists of gold filling, amalgam filling, inlay, a crown, setting up full upper and lower denture to point of flasking. Registration with the Secretary of the Board and the County Clerk. Changes pending.—*Secretary*, J. A. WEST, 417 Utica Bldg., Des Moines, Iowa.

Kansas: Law amended 1909. Requirements: High School certificate (N. A. D. E. Standard), dental degree. June and November examinations usually held in Topeka or Kansas City, according to announcement. Theoretical subjects: Anatomy, histology, prosthesis, oral surgery, materia medica, chemistry, metallurgy, orthodontia, physiology, oral hygiene, operative dentistry, bacteriology, anaesthesia, therapeutics. Practical examinations consist of gold, amalgam and synthetic fillings, prophylaxis operation, and a plate (definite announcements made prior to examinations). License fee $25.00. Undergraduates examined, but no license issued until after candidate receives his diploma. Reciprocity with Arkansas, Illinois, Iowa, Michigan, Minnesota, Ohio, Oklahoma, Tennessee, Wisconsin.—*Secretary-Treasurer*, F. O. HETRICK, Ottowa, Kansas.

Kentucky: Amendments enacted March, 1912. College entrance credentials, fifteen units, for preliminaries; graduation from a dental college. Examinations, first Tuesday in June and December, in Louisville. "Reciprocity with any state with which Kentucky has exchange agreements." License fee $20.00. Registration with State Board of Dental Examiners and County Clerk; annual license renewal before December 31st each year with Secretary of Board; fee $1.00.—*Secretary*, J. H. BALDWIN, 640 Atherton Bldg., Louisville, Kentucky.

Louisiana: Amended law, 1908. College entrance requirements for preliminaries; dental degree from an "accepted" dental college; semi-annual examinations, probably June in New Orleans, license fee $25.00. Reciprocity with Alabama, Illinois, Mississippi, Ohio, Wisconsin. Registration with Secretary of Board of Health, fee $1.00, and Parish Clerk of Court.—*Secretary*, V. K. IRION, 935 Maison Blanche Bldg., New Orleans, Louisiana.

Maine: Amended law approved April 1, 1915. Dental degree required. Examinations held July in State House, Augusta. Law permits interchange; none reported. Fee $20.00; for third examinations $10.00.

Annual Registration with the State Board Secretary in July.—*Secretary*, WILL S. PAYSON, Castine, Maine.

Maryland: Amended law, 1896. Dental degree required. May and November examinations each year in Baltimore. "Theoretical examinations in anatomy, physiology, chemistry, bacteriology, oral surgery, operative and prosthetic dentistry, pathology, therapeutics, and materia medica." Practical requirements: "Insertion of one gold and one amalgam filling in the mouth and the soldering of bridge of not less than four crowns, two of which shall be porcelain, the parts being assembled and invested in advance and soldered in the presence of the Board." No reciprocity; 10 years' practice required. License fee $10.00.—*Secretary-Treasurer*, F. F. DREW, 701 N. Howard St., Baltimore, Md.

Massachusetts: Law pending for 1919. Dental diploma required. June and December examinations in State House, Boston. Board chooses subjects of practical examinations prior to each examination. Law permits interchange; no agreements so far. License fee $20.00. Third examination $10.00. Dental hygienists examined and licensed, fee $10.00. —*Secretary-Treasurer*, GEO. H. PAYNE, 29 Commonwealth Avenue, Boston, Mass.

Michigan: Law amended 1913. Law pending for 1919. High School diploma or fifteen units; dental degree required. June and November examinations in Ann Arbor. License fee $20.00. Interchange with Illinois, Indiana, Kansas, Minnesota, Nebraska, New Jersey, Ohio, Wisconsin.—*Secretary-Treasurer*, B. S. SUTHERLAND, Owosso, Michigan.

Minnesota: Law amended 1911. Dental degree required. Examinations, second Tuesday, March, November, (June), in State University at Minneapolis. Practical requirements: Gold foil and amalgam fillings; gold inlay; crown (any type). "No" non-graduates examined. Reciprocity with District of Columbia, Illinois, Indiana, Iowa, Kansas, Michigan, Nebraska, Ohio, and Wisconsin. Reciprocity fee $50.00. Regular license fee $20.00. Examinations at University of Minnesota. Annual registration with Secretary, May first, fee $1.00.—Address *Secretary-Treasurer*, C. W. BENSON, 323 New Jersey Building, Duluth, Minnesota.

Mississippi: Amended law, 1912. Temporary license issued. Fee $10.00. High School certificate and dental degree required. Examina-

tions held third Tuesday in June, in Jackson.—*Secretary-Treasurer*, B. J. MARSHALL, Marks, Mississippi.

Missouri: Law approved 1917. "Fifteen units of credit" and "certificate in another state or dental diploma required." Examinations, second Monday in June and October, in Jefferson City. Fee $25.00; re-examination $10.00. Certificate license $1.00. Reciprocity with Arkansas, Illinois, Indiana, Iowa, Kentucky, Nebraska, Oklahoma, Tennessee and Vermont. Annual renewal of license with Secretary of Board prior to November 30th each year.—*Secretary-Treasurer*, V. R. MCCUE, Cameron, Missouri.

Montana: Law amended 1909. Five years' practice or dental diploma required. No interchange. Examinations second Monday in January and July, in Helena. License fee $25.00.—*Secretary-Treasurer*, T. M. HAMPTON, Helena, Montana.

Nebraska: Law approved 1905. High School Certificate or fourteen Carnegie Units, and Dental Degree required. June and November examinations in Lincoln and Omaha. License fee $20.00. Practical requirements: one gold and amalgam filling, gold inlay, one crown, full upper and lower set ready for vulcanizing. Interchange with District of Columbia, Iowa, Illinois, Indiana, Kansas, Michigan, Minnesota, Missouri, Ohio, Tennessee.—*Secretary-Treasurer*, S. A. ALLEN, Loup City, Nebraska.

Nevada: Law approved 1905. High School and Dental diplomas required. June and December examinations in Reno or Carson City. No interchange, but law permits it; five (5) years' licensed practice in another state admits to examinations (clinical and prosthetic). Annual Registration with Board on January first.—Address *Secretary-Treasurer*, WM. H. CAVELL, Carson City, Nevada.

New Hampshire: Law approved May 19, 1913. High School and dental diplomas. June and December examinations in Manchester. Written examinations in anatomy and oral surgery, physiology, chemistry and metallurgy, materia medica and anaesthetics, operative and prosthetic dentistry, pathology and therapeutics, histology and bacteriology. Practical examinations consist of gold and amalgam and synthetic fillings, inlay preparation (optional), soldering four-tooth bridge, one abutment being a Richmond crown; articulating either a full upper or lower set of artificial teeth. Fee $20.00. Dental nurse legalized, fee $5.00. Inter-

change with Massachusetts and Vermont. "No formal agreement with any state." Examination last week in June, in Manchester. Registration with the Secretary of State and Secretary of State Board of Dental Examiners.—*Secretary*, H. L. WATSON, 913 Elm Street, Manchester, N. H.

New Jersey: Amended law, 1916. Approved four years' High School diploma or equivalent and certificate of State Supervisor of Public Instruction; also dental degree required. Interchange with Michigan, Vermont, and West Virginia. June and December examinations in Trenton. "Radiography added in June, 1919." License fee $25.00. Reexamination $10.00. Written examinations upon subjects usually taught in a standard dental college. Practical test: Approximal gold filling with approximating tooth in position, compound approximal filling of amalgam, a silicate filling, test in oral prophylaxis, preparation of a cavity for an inlay, with wax pattern of same. Prosthetic tests: Soldering bridge, five teeth, and one Richmond crown; material used, gold or silver. Impressions, dies and articulating models must be submitted. Wax bite, anatomical articulation of a full upper and lower denture (plain teeth) imbedded in wax on trial plate, must be submitted. Annual registration with the Secretary of the Board; fee $2.00.—*Secretary*, J. G. FORSYTH, 430 E. State Street, Trenton, N. J.

New Mexico: April, 1919. Under the new law now in effect all applicants must take the examination, and must present satisfactory evidence of having graduated from a recognized dental school, either by presenting his diploma or by sworn statements from some authorized person that he is a graduate of same. Application blanks furnished by the Board.

The examination will consist of both written and practice, written in such subjects as taught in the Class A and B dental schools, the practice to be of work in the mouth as selected by the examiners sufficient to test the skill of the operator, and the applicant is instructed to bring models for full denture, with two separate models for crowns. These may be made and mounted on articulators before coming.

Applicants will be expected to come fully prepared to do all classes of work, as no excuse will be taken for lack of equipment. Board will furnish chairs for operating and tables for laboratory work.

The next examination will be held in Albuquerque, beginning June 23, 1919.

Diploma from a dental college. No interchange. June examinations in Albuquerque. License fee $25.00; certificates $10.00. Practical requirements: gold, amalgam, and cement fillings, gold inlay, crown and

bridge work, plate to point of flasking. Examination in Albuquerque. Annual registration with Secretary, fee $3.00.—*Secretary*, A. J. MORAN, Deming, New Mexico.

New York: Law amended Sept. 1, 1917. Four years' registered High School or equivalent, 72 Regents' Counts, and dental diplomas required. After January 1, 1921, a diploma from a four years' course registered dental college. January, June and September examinations in New York, Albany, and Buffalo. License Fee, $25.00. Theoretical examinations in anatomy, chemistry, metallurgy, operative and prosthetic dentistry, therapeutics, and materia medica, physiology and hygiene, oral surgery, pathology, histology. "No reciprocity." Oral hygienists (females) examined and licensed; fee $5.00. Six year clause exempts from written examinations. "25 year practitioners (legal) in another state exemption." Registration with clerk of initial county of practice. Annual re-registration with the Secretary of the Board prior to September 1st; fee $2.00.—*Secretary*, MINOR J. TERRY, Education Building, Albany, New York.

North Dakota: Law amended 1919. Entrance requirements for state university, or four years' High School and dental diplomas. Examinations second Tuesday in January and July, in Fargo; fee $25.00. Practical requirements: "The making of gold foil and amalgam operations; a gold crown and a porcelain crown; and a set of teeth; articulated crown and bridgework; Hygiene test." Reciprocity with "Those states having and maintaining the same requirements." Reciprocity fee $50.00. Renewal registration with the Secretary of the Board before July 1st each year; fee $2.00.—*Secretary*, W. E. HOCKING, Devils Lake, North Dakota.

North Carolina: New law, March 9, 1915. High School or equivalent dental degree; January and June examinations in Durham. License fee $20.00. No reciprocity. Practical examinations consist of one gold, one amalgam, and one enamel filling; also models of an edentulous mouth upon which applicant will be required to set up and articulate a full set of Trubyte teeth. Registration with Clerk of Superior Court and Secretary of Board.—*Secretary*, F. L. HUNT, Asheville, North Carolina.

Ohio: New legislation pending. Requirements, First Grade High School diploma; graduation from a dental college. Examinations fourth Monday in June and October, in State University, Columbus. License fee $25.00. Practical requirements: Gold, amalgam, and synthetic fillings; articulating of a full denture and making a Richmond

crown. Reciprocity with District of Columbia, Iowa, Illinois, Indiana, Kansas, Louisiana, Michigan, Minnesota, Nebraska, Tennessee, and Wisconsin. Next examination in Columbus.—*Secretary*, HOLSTON BARTILSON, 150 E. Broad St., Columbus, Ohio.

Oklahoma: Law amended 1919. Requirements: High School and dental diplomas. Examinations, June and December, in Oklahoma City. License fee $25.00. Interchange with Arkansas, District of Columbia, Indiana, Kansas, Missouri, Nebraska.—*Secretary*, H. R. WATKINS, 240 American National Bank Building, Oklahoma City, Oklahoma.

Oregon: Law amended 1919. Dental degree required from a dental college member of the N. A. D. F. June and November examinations in Portland or Salem. License fee $25.00. N. A. D. E. standard of requirements; practical tests announced. No temporary permits and no interchange.—*Secretary*, WM. D. MCMILLAN, La Grande, Oregon.

Pennsylvania: Amended law, 1915. Requirements: Four years' course High School or its equivalent, fifteen units (held prior to matriculation) and dental diploma. After January 1, 1921, dental degree from a four years' course registered dental college. Examinations, June and December, held simultaneously in Philadelphia and Pittsburg. Practical requirements: gold and amalgam fillings; four-tooth bridge; upper and lower plate. License fee $25.00. No interchange. Registration with the Secretary of the Board of Dental Examiners every year, fee $1.00, and with the County Court at the beginning of practice.—*Secretary*, A. H. REYNOLDS, 4630 Cedar Avenue, Philadelphia, Pa.

Rhode Island: Law amended 1918. Legal protection provided for examinee. High School and dental diplomas required. June examinations last week, or first week in July, in Providence. Fee $25.00; annual registration fee $1.00.—*Secretary*, EARNEST A. CHARBONNEL, 334 Westminster St., Providence, Rhode Island.

South Carolina: Law amended 1911. Temporary licenses granted; examination in June at Columbia. Undergraduates examined under Rule X. No reciprocity. License fee $15.00.—*Secretary*, R. L. SPENCER, Bennettsville, South Carolina.

South Dakota: Law effective 1909. College graduates examined. January and July examinations in Sioux Falls. No reciprocity. License fee $25.00.—*Secretary*, L. S. SPENCER, Watertown, South Dakota.

Tennessee: Law amended 1913. Dental diploma required. June examinations in Nashville. Fee $15.00. Reciprocity with Iowa, Kansas, Nebraska, and Ohio. Fee for incoming dentist $15.00; outgoing dentist $5.00.—*Secretary*, WALTER G. HUCHISON, 308 Eve Building, Nashville, Tennessee.

Texas: Law enacted 1905. Prospective legislation: A "new Texas Dental law will be enacted June 17, 1919, requiring a diploma from a reputable Dental School." Temporary licenses optional with Board; fee $2.00. Examination with or without diploma, fee $25.00. No interchange. Examinations, December, in Dallas. Requirements: one gold foil filling, one amalgam filling; gold crown and Richmond crown; set up teeth for plate work.—*Secretary*, HARRISON B. CAVE, 810-814 Wilson Building, Dallas, Texas.

Utah: Law amended 1909. Four years' High School and dental diplomas required; non-graduates examined. Licenses without examination may be granted at the discretion of the Board. Annual registration with the Secretary of the Board; fee $1.00. June and November examinations held in Salt Lake City; fee $25.00. Reciprocity with none; law permits it.—*Secretary*, J. F. CHRISTIANSON, 1002 Walker Bank Bldg,, Salt Lake City, Utah.

Vermont: Law amended 1914. High School and dental diplomas required. Examinations, last Monday in June, in Montpelier. Fee $25.00. Reciprocity with Illinois, Iowa, Indiana, Kentucky, Maine, Missouri, Nebraska, and New Jersey. Registration with Secretary of State.—*Secretary*, H. F. HAMILTON, Newport, Vermont.

Virginia: Law amended 1914. High School or equivalent (twelve units), and dental diplomas required. Examinations in June, in Richmond; fee $10.00. May interchange, none reported. Practical examination consists of one gold filling, one four-tooth bridge, and upper and lower set of teeth. Annual registration in April with the Secretary of the Board; fee $1.00.—*Secretary*, J. L. WALKER, 505 Taylor Building, Roanoke, Virginia.

Washington: New legislation pending. Dental diploma required. May and November examinations in Spokane, fee $25.00.—*Secretary*, FRANK B. LYNOTT, 249 Peyton Block, Spokane, Wash.

West Virginia: Law amended 1915. Four years' High School and

dental degree required. Examinations, last Tuesday in June, in Wheeling. License fee $25.00. Certificate $2.00. Interchange with New Jersey and the District of Columbia. Biennial registration with Secretary of Board; initial registration with the County Clerk; fee 50 cents.—*Secretary,* R. M. HITE, Mannington, West Virginia.

Wisconsin: Law amended 1914. Requirements: Four years' High School, or fifteen units, and dental diplomas. June and December examination held in Milwaukee; fee $25.00. Interchange with Illinois, Iowa, Kansas, Louisiana, Michigan, Minnesota, Missouri, Montana, Nebraska, and Ohio. Practical examination includes "Mouth examination, gold filling, gold inlay, gold shell crown, articulation of full denture."—*Secretary,* F. S. TATE, Rice Lake, Wisconsin.

Wyoming: Amended law, 1905. Dental degree required. Last Tuesday in June, examinations in Cheyenne. Fee $25.00. I. Theoretical examinations in anatomy, physiology, histology, bacteriology, chemistry, metallurgy, oral surgery, anaesthetics, operative and prosthetic dentistry, materia medica and therapeutics, prophylactics and orthodontia. II. Practical work will also be required; amalgam, cement and gold foil fillings; inlay, crown and bridge work and plate. No interchange.—*Secretary,* PETER APPELL, P. O. Box 643, Cheyenne, Wyoming.

Alaska: New law, 1913. All applicants examined; dental degree required. Theoretical and clinical examinations held the second Monday in January and July, in Juneau; fee $25.00. Law permits reciprocity. "Theoretical examinations include operative and prosthetic dentistry; osteology, dental and general anatomy, histology, bacteriology, physiology, pathology, chemistry, metallurgy, materia medica, therapeutics, orthodontia and anaesthetics. Demonstrations in operative and prosthetic dentistry will be required, also prognosis and diagnosis. All applicants must furnish their own material for demonstrations. If the examinations prove satisfactory to said Board of Examiners, they shall issue a certificate of registration to the person examined." (Part of Section 5.) Annual registration prior to July 1st; fee $4.00.—*Secretary,* ELMO H. KASER, Juneau, Alaska.

Hawaii: Law revised 1917. Dental diploma required. Practical and theoretical examinations held in July annually, at Honolulu, in the usual subjects. Operative: Root filling and malleted gold filling; cavity selected by examiner. Prosthetic: Upper and lower dentures and a crown or bridge. Orthodontia: Regulating appliance, case selected by exam-

iner. No interchange. License fee $20.00. Annual registration with Secretary of Board, January 1st; fee $2.00.—*Secretary*, F. E. CLARK, 137 Fort St., Honolulu, Hawaii.

Porto Rico: Law of 1917. Examination with or without diploma. Practical and theoretical examinations held during February and August in San Juan. Examination fee $20.00. Certificate $5.00.—*Secretary*, L. R. NOA, 6 San Justo, San Juan, Porto Rico.

Philippine Islands: New law, 1915. Temporary licenses issued, fee $5.00. Dental degree required. Examinations held during January and July each year at Manila. License fee $10.00. No reciprocity.—*Secretary*, MIGUEL DE LA CONCEPCION; address T. Pinpin, No. 25, Manila, P. I.

[NOTE: Every effort is made to have this information correct and official. The author welcomes authoritative corrections if errors are noted.]

THE GAME OF LIFE

Any one would be a fool who would sit down to a game of chess on the winning or losing of which depended his life and fortune without knowing something of the rules of the game.

Yet it is a very plain and elementary truth that the life, the fortune and the happiness of every one of us do depend upon our knowing something of the rules of a game infinitely more difficult and complicated than chess. It is a game which has been played for untold ages, every man and woman of us being one of two players in a game of his or her own. The chessboard is the world, the pieces are the phenomena of the universe; the rules of the game are what we call the laws of nature. The player on the other side is hidden from us. We know that his play is always fair, just and patient. But also we know, to our cost, that he never overlooks a mistake, or makes the smallest allowance for ignorance. To the man who plays well, the highest stakes are paid, with that sort of overflowing generosity with which the strong shows delight in strength, and one who plays ill is checkmated—without haste, but without remorse.

—HUXLEY.

PREPAREDNESS LEAGUE NOTES

"WHERE THERE IS NO VISION THE PEOPLE DIE"

These words of the prophet seem to have been written especially for the dental profession. If we have no vision we must die. The great things that are immediately before us are merely awaiting our vision and effort to make them practical realities.

The call of progress and humanity is ringing from end to end of the civilized world as never before. As a profession we must appreciate this and through it derive the benefits from the war which are within our grasp. Our experience in the last few months in endeavoring to put forward different plans with this object in view has been quite discouraging. We seem to have dismissed the whole matter from our minds and are confining our energies to our own selfish interests. For the sake of our profession's future, let us carry the banner of *service* to the highest peak of mastery, that it may be seen and known throughout the world.

OUR CHANCE TO BEFRIEND OUR BROTHER DENTISTS

Our brother dentists of devastated France and Belgium need immediate help. The Germans drove them from their offices, appropriated their equipment, separated them from their families, and in many cases completely destroyed their towns.

A majority took up arms and fought in the trenches, many being killed, while many more were partially or wholly incapacitated.

There are hundreds of cases where the wives and children of our brother dentists have suffered unspeakable tortures and are now without means of sustenance and support.

LET THE DENTAL PROFESSION TAKE CARE OF ITS OWN

These dentists are our brothers! Their trials, ambitions, hopes and lives have been the same as ours. Through the ravages of the diabolical

Hun they are to-day without means to help themselves. Will we not stretch forth a helping hand? Will we not give them a brotherly and fraternal handclasp and put into their exhausted spirit renewed hope, renewed ambition?

Place yourself in their position and think what assistance would mean to you, especially when it comes from a source with which your lifework has been identified.

Let the contributions of American dentists be their means of rehabilitation! Is it not a glorious thought? Let us muster our forces and carry forward to success this splendid object.

Following is an excerpt from a letter from Dr. Georges Villain of Paris: "The dentists of the North of France and Belgium have suffered terribly during the war. The Germans have removed and taken to Germany or destroyed all their material. Other dentists, half of the French practitioners, have left their offices since August 1914 and will have to build over their practice. Some have been wounded to an extent that will oblige the use of special outfits to enable them to carry on their professional activities. Others are mutilated and will not be able to practise any more.

"Our professional brothers have given their lives, their limbs or their wealth, which amounted sometimes only to the value of their material, for the cause of liberty and freedom of the world, which is the cause of every one of us; what they have given we benefited; that is why we cannot do too much. France has so much to do and everyone over there suffered so much that we cannot expect much better results than those obtained."

Through the marvelous skill of Dr. Villain and associates, fully 250,000 men who were injured by the war have been dentally restored and duly returned to the fighting lines.

In 1915 the Society l'Aide Confraternelle was organized by French and Belgian dentists for the following purposes:

"(1) To facilitate the return to normal life of all colleagues severely injured by the war, by giving to them or advancing as an honorable debt the necessary means to re-establish themselves; and

"(2) In the invaded districts to help in the reconstruction of destroyed homes and in newly equipped dental offices devastated by the enemy, so as to enable dentists to resume their practice."

A little more than $20,000 was raised, which amount was wholly inadequate to meet the demands. Our brother dentists of France have exhausted their resources and cannot do more without aid from us.

All funds raised by the Preparedness League of American Dentists will be sent to the Treasurer of l'Aide Confraternelle, M. Fontanel, Paris, France, and judiciously disbursed according to the most worthy

and pressing needs. A committee of American dentists in France will assist in directing the work.

A recent letter from Dr. E. C. Kirk states: "I have just returned from Europe, and I can assure you that there is abundant need for every item of help we can render in the rehabilitation of our colleagues who have lost everything in the war-devastated areas."

Lieutenant-Colonel Laflamme (successor to Colonel Logan in the Surgeon General's Office) states: "Your communication having reference to the furnishing of equipment for the French and Belgian dentists received. Wish to inform you I can safely and frankly state this office will, as in the past, be ready to support any movement that has for its end such lofty and generous ideas as mentioned in your letter."

Now is the time to show a true spirit of helpfulness where most needed. A strict accounting will be made to all contributors and every protection afforded the handling of funds.

Make all checks payable to Dr. L. M. Waugh, Treasurer, Preparedness League of American Dentists' Fund for French and Belgian Dentists, 576 Fifth Avenue, New York, N. Y.

The following is an extract from a letter from Captain Blake A. Sears, Replacement Depot, Second Army, American Expeditionary Forces, France:

"As for the Belgian dentists, from all that I can learn, they are anxious for someone to finance them and let them alone. At the present time many of these dentists are sending their patients to the American camps for the necessary dentistry, and telling their patients that they cannot do the work, as they cannot purchase materials.

"The French dentists in this sector are not doing any dentistry. They just say that they have all they can do to get food at present without thinking of practising dentistry, as the people are without the necessities and cannot have work done. Simply, the teeth have to ache and then they are pulled. It is a case of where life does not depend upon one tooth and they are willing to sacrifice many as long as they can get food. Clothes are not up to date. Many are wearing discarded clothing from the armies, and they are not particular whether the trousers are from the French and the coat from the German, as long as they are warm. I have seen some of the women wearing hobnailed shoes from the U. S. Army, coats from the Italian, hats from the German, coats from the British, but the greater the variety of clothing, the better they appear to like it."

J. W. BEACH, President.

THE FORSYTH DENTAL INFIRMARY FOR CHILDREN

PERMANENT STAFF APPOINTMENTS

A competitive examination of graduates in dentistry (of less than three years' standing) for appointments to positions on the Permanent Staff for full and one-half time service will be held early in June at the Infirmary.

Appointments will be made for one or two years as follows:

Full time service requiring operating five and one-half days a week at a salary of $1000 a year;

One-half time service requiring operating six half-days a week, either forenoon or afternoon, at a salary of $500 a year.

These appointments will be made subject to satisfying the requirements of the Massachusetts State Board of Registration in Dentistry, and to "qualifying" in the practical work of the clinics during one month's trial.

Members of this staff are entitled to the advantages of reports and clinics by experts in the various branches of Dentistry from different parts of the world, in addition to the numerous special and regular clinics and lecturers.

Operators after serving four months are eligible, by qualifying, for appointments in the special clinics where Post Graduate work is given.

The operators on this staff have the advantage of the clinics and lectures of the Post Graduate School of Orthodontia.

The Infirmary clinics provide unusual advantages in the various departments of the institution where Operative Dentistry, Orthodontia, Nose and Throat and Oral Surgery, Extracting, Novocaine Technic, Radiography, Pathological Diagnosis and Research work are continually carried on.

The average number of cases treated daily in the various clinics is over 300.

Supplies and necessary operating instruments are furnished; up-to-date apparatus including electrical engines, sterile instrument trays, fountain cuspidors, compressed air, and the modern operating-room-type of lavatories are available for use.

A diploma of service will be issued by the Trustees to each member of this staff who has completed this term of service in a satisfactory manner.

Information and the date of the examination will be furnished to those interested.

HAROLD DEW. CROSS, D.M.D., *Director*,
140 The Fenway, Boston, Mass.

UNDERGRADUATE ASSISTANTS

During the months of June, July, August, and September, an opportunity is offered by the Trustees of the Forsyth Dental Infirmary for Children to a limited number of undergraduate students to act as assistants in the clinics of the Infirmary. This privilege permits a student to obtain unusual clinical advantages in the various departments of the institution where Operative Dentistry, Orthodontia, Nose and Throat and Oral Surgery, Radiography, Pathological Diagnosis and Research Work are continually carried on.

Operators' gowns, instruments and filling materials are furnished. Over three hundred children are treated daily.

For further details apply to the Director,

DR. HAROLD DEW. CROSS, 140 The Fenway, Boston, Mass.

AMERICAN DENTISTRY IN SIBERIA

The above is one of the first photos of some of the United States Army stationed at the Archangel front to "restrain" the Bolsheviki.

The picture shows an improvised office for American dentistry in operation, a Red Cross man in the chair, and a Russian peasant awaiting his turn, probably his first time to be in the hands of a trained dentist.

PRACTICAL HINTS

This department is in charge of Dr. V. C. Smedley, 604 California Bldg., Denver, Colo. To avoid unnecessary delay, Hints, Questions, and Answers should be sent direct to him.

RUBBER-DAM TOILET.—Rubber-dam as it is sold to us, should never be used without first cleansing it, and in part sterilizing it. The dressing that the manufacturer puts upon it renders it strictly unpleasant and unclean. After thoroughly washing it in a mercury bichloride solution, and rinsing in clean water it should be thoroughly dried and carefully dusted with borated talcum powder. This gives the rubber a clean, pleasant odor and taste. It gives it a smooth satin surface, which will allow it to readily pass into the interproximal spaces without the use of vaseline.—*Pacific Dental Gazette.*

Editor of Practical Hints:

Here is a very good hint for publication. I have used this for over ten years and could not keep school without same:

A sticky wax that is sticky, yet pliable, and sets hard instantly when chilled and boils out clean.

Melt the wax that Twentieth Century teeth are mounted on in a shoe blacking tin box, and add a few chunks of rosin till same is slightly pliable. When cold if too pliable add more rosin. This wax remains the same temperature as the lab, and it will enable you to assemble dummies and move to proper position, as same are not brittle.—APPLEBY AND LESTER, Seattle, Wash.

Editor of Practical Hints:

I have a peculiar case that I would like to ask advice upon.

An upper second bicuspid treated with an arsenic preparation to devitalize about two years ago. The treatment was completed and restoration made with amalgam.

The case was presented to me about two weeks after the filling was placed (by another dentist). The gum showed indication of slight

arsenic poisoning and patient complained of soreness of gums and tooth. I removed filling and examined root canals. These seemed to be well filled and in good condition. I also curetted gum and process. The tooth apparently returned to normal with some loss of tissue in proximal space. Tooth was refilled and remained without causing trouble about nine or ten months. Patient returned at this time with the tooth sore and slightly loose, while the buccal gum over first and second bicuspids showed several small white spots which proved to be dead tissue, and upon removal left shallow, ragged depressions. Looked to me like arsenic but responded to local treatments seemingly and tooth again became normal.

This patient returned to my office later with much the same condition after several months of comfort and service from this tooth. The patient complained of pain in the eye on this side and there is again the whitish spots only on the buccal gums and extending over the first molar region to the canine of that side. There is considerable soreness upon pressure over antrim, and face appears slightly swollen or fuller.

I advised extraction, but patient objects. We do not have access to an X-ray here. What, in your opinion, is the trouble? Would extraction and curettement relieve condition, or should a film be taken before anything is done?

Hope I have presented my case fairly clear, and will look for your early reply.

L. V. HASTINGS, D.D.S.

ANSWER.—The inflammation of the gum and white patches might either be simple Herpes or Vincent's Angina, though the deep-seated soreness and swelling high up would certainly cast suspicion on the antrum as being infected. Good X-Ray pictures would certainly help in your diagnosis. Lacking this, however, an infected antrum can frequently be promptly diagnosed by transillumination (place a small electric light in the mouth in a darkened room). The cheek with infected antrum will not illuminate as non-infected one.

In all probability the devitalized bicuspid should be extracted, and if antrum is involved it should be drained through the socket.—V. C. S.

Editor Practical Hints:

Your remarks about devitalizing pulp in a recent issue of DENTAL DIGEST greatly interested me. You say you practically never devitalize a pulp unless it is not only exposed but diseased. That seems to imply that

you cap pulps. I can recall nothing in recent literature favoring this practice except a rather vague remark (at least I remember it vaguely), in an article by Drs. Eisen and Ivy of Minneapolis, shortly before Dr. Eisen's death. If you have had any successful experience with it I feel sure many would be interested, especially after the depressing reports about root-fillings that have lately come from Cleveland.

JOSEPH L. BARBER.

ANSWER.—We certainly do cap pulps in our offices with as good an average of satisfactory results as with any other dental procedure, saving, I should say, about 95 per cent. of all attempted.

We have been following this procedure in our offices for over twenty years. These teeth respond normally to all the tests for vitality years after the cappings have been placed. And frequently in years gone by when we devitalized more teeth for bridge abutments, etc., we have removed these cappings to find healthy, normal pulp tissue beneath. Dr. R. J. Gardinier now residing at 1245 22nd St., San Diego, California, is the originator of this formula and if you care to write him no doubt he can tell you more about it. I have had the pleasure of spending a few hours with him in his home where he has retired from active practice because of ill health. And he tells me that he has frequently capped pulps that were decidedly diseased after removing all decayed dentine and actually cutting off and removing included portion of congested or diseased pulp, thus causing and permitting considerable hemorrhage; then sealing in on a pellet of cotton a dressing of his capping liquid, changing this each day for two or three days. The remaining portion of the pulp will then be soothed and returned to a normal state of health, and may be capped with reasonable assurance that it will remain alive, normal and healthy during the life of the patient or as long as the other teeth remain. Be this as it may, you may rest absolutely assured that a non-infected pulp, one accidentally exposed, or an exposure that has been covered by slow leathery decay and where there has been no aching, may be capped with impunity and with every confidence in its future good conduct. Dr. Gardinier says that it is better in every case that if there is any suspicion on your part that pulp may be infected, to cut a bit of the pulp tissue away thus drawing some blood before applying capping.—V. C. S.

Editor Practical Hints:

Having the six upper anterior teeth and a second molar (right), with gold crown on left cuspid, what would you consider the best form of

attachment to said crown? Or would you use a cast clasp? This is a case of gold saddles and pallatine arch.

M. A. GATES.

ANSWER.—For esthetic reasons I would first eliminate the gold crown on the cuspid, making necessary restoration with porcelain crown, gold or porcelain inlays and then use a Reach broad M. O. D. cast clasp for attachment.—V. C. S.

Editor Practical Hints:

To correct the "bite" in a bridge or plate: Dry your tooth or teeth and melt black wax over them, and the point of contact will be fixed at a glance.

This simple rule is so helpful that I offer it to those who need it, being grateful for helping hints in DENTAL DIGEST myself.—R. W. MORRIS, Los Angeles, Cal.

Editor Practical Hints:

I have a little boy eight years old who had an abscess on the buccal side of the temporary lower left first molar. I lanced the abscess and in ten days extracted the tooth. A month after extracting the tooth the swelling was about the same size, having no pain with pressure as before lancing.

It feels like a bicuspid under the gum. If X-ray should prove no tooth under gum, could the swelling that stays hard be a tumor caused by an effusion of blood, and if so will the swelling disappear in time? What treatment in such cases would you or some reader of DIGEST advise?—C. W. W.

ANSWER.—I would certainly have place X-Rayed. If the film shows tooth coming normally, as it most likely will, I should pay no further attention to the swelling unless it should persist for many months, or get radically worse.—V. C. S.

DENTAL ECONOMICS

WHO IS RESPONSIBLE WHEN CONSIGNED GOODS ARE DESTROYED OR DAMAGED?

By Elton J. Buckley, Philadelphia, Pa.

[Readers of The Dental Digest are invited to submit questions of a legal nature to Elton J. Buckley, care of The Dental Digest. This service is free.—Editor.]

One of the papers publishing these articles sends me the following query, which I consider of sufficient importance to discuss here:

> In response to one of your interesting articles, one of our subscribers has put a legal question up to us and we are wondering whether you would be kind enough to let us have your opinion.
>
> Some time ago a concern placed some jewelry in his store to be sold on commission—unsold goods to be returned. Most of the goods were destroyed by fire, as was a consignment of garden seeds also placed upon the same basis. Can these concerns collect for the goods lost? Of course insurance companies have told him that it was impossible to insure these goods, as they did not belong to him.

The question therefore is:

When goods are in a store on consignment, title still remaining in the seller, and the possession of the holder being merely for the purpose of sale, whose is the loss if the goods are destroyed by fire?

The question might be extended to include cases where the consigned goods are stolen, or lost, or damaged in some way other than by fire. Naturally the same legal principle applies to all.

The answer is that the consignee is not responsible for damage or destruction unless same is caused by his negligence. I will apply that in a moment.

Placing one's property in the possession of another is called bailment. There are several kinds of bailment, each one with its own principles of law, but sending goods on consignment is "bailment for mutual benefit." Each party gets something out of it; in other words, it isn't like the lending of one's automobile, which is bailment for the sole benefit of the bailee (the borrower).

Where bailment is for mutual benefit, the consignee or holder of the goods is obliged to give them only ordinary care, and will be held re-

sponsible if anything happens to them through ordinary negligence on his part. If he has given them ordinary care, and has not been negligent, and a fire occurs and destroys them he is not liable. The loss is on the owner.

Ordinary care is the kind of care which an ordinarily prudent man would use in looking after his own property. The lack of that degree of care would be ordinary negligence.

Here is a statement of the law as to the consignee's liability for loss or damage to goods on consignment by him:

> Where a bailment is for mutual benefit, the bailee (consignee) is held to the exercise of ordinary care in relation to the subject matter thereof (i.e., the goods held) and is responsible only for ordinary negligence. He is not liable if the subject matter of the bailment has been injured by some internal decay, by accident or by some other means wholly without his default, and in the absence of some special stipulation an injury to or loss of the property falls on the bailor. The bailee may, however, be liable for any injury or loss arising through the acts of his employes unauthorized by the bailor.

Note the words "in the absence of some special stipulation."

A great many of these concerns that make a specialty of shipping goods on consignment will try to get you to sign a receipt agreeing to be responsible in case the goods are lost, destroyed, or damaged while in your possession. Many times consignees have had to stand a loss because they had agreed, probably without thinking of it, or thinking that they were responsible anyway, to become responsible for all loss or damage.

I repeat, the consignee is responsible for such loss only if he has caused it by his own negligence. What would be negligence in such a case? Any carelessness which would open the way to the thing that happened. If you left a box of garden seeds which you were holding on consignment outside the store in a box, open and unprotected all day long, it would—in case they were stolen—be negligence.

I don't understand the statement in the above question: "Of course insurance companies have told him that it was impossible to insure these goods, as they did not belong to him." So far as I know, any insurance company will insure goods of a consignor in the hands of a consignee. It is well settled that a bailee (consignee) has an insurable interest in goods consigned to him, and can insure them for the joint benefit of himself and the consignor. If the goods are valuable and there is any risk in holding them, I consider it a good thing to insure them, as the cost is always small and it settles all questions of liability.

APPROPRIATION FOR SANITARY UNITS

The American Red Cross has appropriated an additional $100,000 for the maintenance of its sanitary units and dispensaries at the military cantonments of the country to the end of June. The plan of the Red Cross to continue its activities in this direction has the approval of Surgeon General Blue of the United States Public Health Service.

The terrible effect of the demon cigarette and the demon vin blanc and the demon beer on our boys who were Over There was evident to any man who saw the parades of the home-coming heroes. The poor fellows were so husky and full of pep that they could not march more than forty-eight miles at a time and could not eat more than eight meals a day.

EXTRACTIONS

Do you like to read about Love?

Oh, you do! but only in the month of June, you say?

Well, this is the "lovable" month of June, so let us take a slant at some of the "remarks" which have been volplaning down the ages about one of the oldest things in the world.

It is remarkable that no passion has been treated by all who have touched upon it with the same bent of design but Love. The poets, the moralists, the painters, in all their descriptions, allegories, and pictures, have represented love as a soft torment, a bitter sweet, a pleasing pain, or an agreeable distress; and have only expressed the same thought in different words.

Love rules the court, the camp, the grove,
And men below and saints above;
For love is heaven and heaven is love.

"Are you sure you love me?" said the pretty girl to her lover.

"Love you!" echoed the smitten one. "Why darling, while I was bidding you good-bye on the porch last night your dog bit a piece out of the calf of my leg, and I never noticed it till after I got home."

Love! What a volume in a word! An ocean in a tear! A seventh heaven in a glance! A whirlwind in a sigh! The lightning in a touch! A millennium in a moment!

When there is love in the heart, there are rainbows in the eyes, which cover every black cloud with gorgeous hues.

The only way for a man to be really happy when married, is to tell his wife absolutely everything. She will guess the rest herself.

It is not certain that women love more than men, but it is indisputable that they love better.

If my worst fault is being in love, I would not exchange it for the best virtue.

A world of love is the best world; a being of love is the best being; the art of love is the best art; the science of love is the best science; the philosophy of love is the best philosophy; the poetry of love is the best poetry; the government of love is the best government; the religion of love is the best religion.

Some love stunts: Love is blind. Love is eternal. Love is a dream. Love conquers all things. Love laughs at locksmiths. I cannot understand; I love. In love we are all fools alike. That you may be loved be amiable. The first sigh of love is the last of wisdom. Love is the art of hearts, and the heart of arts. Love, well understood, is wisdom. If nobody loves you, rest assured it is your own fault.

Love can hope where reason would despair.

The lovers were having their first desperate quarrel. He was always a fluent talker, but he had nothing on the girl when it came to the point of handing out some of the things that rattled around in the back of her vivid mind. She accused him of being the meanest and silliest mortal alive, and would now insist on never, never seeing him again, and was glad of the chance to tell him so.

He was not at all backward in summing up her little failings, as he knew them, things she never would have heard about were it not for this terrible break in their affections which was now to separate them forever.

The quarrel continued until both were practically exhausted and apparently ready to kill each other. After a brief silence the young man resumed the "conversation" by very meekly announcing that he had one request to make before the final parting.

"No!" she said; "I hate you! I'll grant you nothing."

"But," he stammered, "you must grant me this request, and I'll willingly depart never to see you again."

"Don't you dare to tell me I must do something or anything you ask. Be careful, sir, how you talk in my presence."

"But I beg of you to grant me this one little favor before I go."

"Well, what is this paltry favor?" she snapped, looking him straight in the eye.

And he softly said: "Will you please take your arms from around my neck?"

THE BEST OF CURRENT THOUGHT

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PARENTAGE OF GREAT MEN

When we remember that most of the great leaders of mankind came of humble parents; that many of the greatest geniuses had the most lowly origin; that, for example, Beethoven's mother was a consumptive, the daughter of a cook, and his father a confirmed drunkard; that Schubert's father was of peasant birth and his mother a domestic servant; that Faraday, perhaps the greatest scientific discoverer of any age, was born over a stable, his father a poor, sick blacksmith and his mother an ignorant drudge, and that his only early education was obtained in selling newspapers on the streets of London and later in working as apprentice to a bookbinder; that the great Pasteur was the son of a tanner; that Lincoln's parents were accounted "poor white trash" and that his early surroundings and education were most unpromising, and so on through the long list of names in which democracy glories—when we remember the great men of humble birth we may well ask whether aristocracy can show as good a record. The law of entail is aristocratic, but the law of Mendel is democratic.

Quaint old Thomas Fuller wrote many years ago in his "Scripture Observations:"

"I find, Lord, the genealogy of my Saviour strangely checkered with four remarkable changes in four immediate generations:

"1. Roboam begat Abia, that is, a bad father begat a bad son.

"2. Abia begat Asa, that is, a bad father a good son.

"3. Asa begat Josaphat, that is, a good father a good son.

"4. Josaphat begat Joram, that is, a good father a bad son."

"I see, Lord, from hence that my father's piety cannot be entailed; that is bad news for me. But I see also that actual impiety is not always hereditary; that is good news for my son."

It may be objected that I have ended by denying that there is any inheritance, at least so far as intellectual and social qualities are concerned, but this is not the case. While it is true that good and bad hereditary traits are widely distributed among all classes and conditions of men, they are not equally distributed.—*Scribner's Magazine.*

PSYCHIC DENTISTRY

People who hanker after a good facial expression, or having the facial expression want to make sure of keeping it, ought to consult a dentist every now and then. Dentists can't manufacture souls precisely, but they can go a long way toward giving the outward and visible signs of whatever inward and spiritual graces you may choose to appear to possess. Once you've acquired the outward sign your inward spirit has a way of reflecting the grace. I've known cases where the disposition was improved through dentistry.—*Exchange.*

FUTURE EVENTS

The Nebraska Board of Dental Secretaries will hold its examination as follows: The practical work at the Creighton Dental College, Omaha, June 2-3; and the theoretical work at the Capitol Building, Lincoln, June 4-5-6. A special examination is being arranged for about one month later.

S. A. ALLEN, *Secretary.*

The next meeting of the Board of Dental Examiners of California for the purpose of examining applicants for a license to practise dentistry in that state will be held in the City of San Francisco, beginning on the 5th day of June, 1919, at 9:30 A.M. This examination will be followed by an examination to be held in the City of Los Angeles, beginning on the 14th day of July, 1919, at 9:30 A. M.

C. A. HERRICK. D.D.S., *Secretary,*
133 Geary St., San Francisco, Calif.

The Board of Dental Examiners of Alabama will hold an examination for certificates in the Birmingham Dental College, June 16th. Application blanks must be filled and in the hands of the Secretary not later than June 2nd.

DR. A. K. PARKS, *Sec.-Treas.,*
412-14 First Natl. Bank Bldg., Montgomery, Ala.

The next meeting of the Iowa State Board of Dental Examiners for the examination of Candidates for licenses will be held at Iowa City, at the College of Dentistry, commencing Wednesday, June 18, 1919, at 9 A.M.

DR. J. A. WEST, *Secy.,*
805 Pleasant St., Des Moines, Ia.

The Connecticut Dental Commission will meet at Hartford, on June 19th, 20th and 21st, 1919, to examine applicants for license to practise dentistry, to examine applicants for dental hygienist's license, and to transact any other business proper to come before said Commission.

EDWARD EBERLE, *Recorder,*
902 Main St., Hartford, Conn.

The next meeting of the Committee of Dental Examiners for the examination of applicants for licenses to practise Dentistry in Illinois will be held in Chicago, the week commencing Monday, June 23. For application and further information, address the Department of Registration and Education, Springfield, Illinois.

F. C. DODDS, *Supt. of Registration.*

The next examination by the Pennsylvania Board of Dental Examiners will be held in Philadelphia and Pittsburgh on Monday, Tuesday, Wednesday, Thursday, June 23, 24, 25 and 26, 1919. The practical examination will be held on Monday, June 23d, the first day, in the University of Pittsburgh Dental School, in Pittsburgh, and the Evans Institute, University of

Pennsylvania, Philadelphia. The operative examination will be held at 8:30 A.M., and the prosthetic examination at 1:30 P.M. The theoretical examination will be held at the College of Pharmacy in Pittsburgh, and at Musical Fund Hall, Philadelphia.

Application papers can be secured from the Department of Public Instruction, Harrisburg. For further information address the

Secretary, ALEXANDER H. REYNOLDS,
4630 Chester Avenue, Philadelphia.

The North Carolina Dental Society will hold its next Annual Session June 25th, 26th, and 27th, 1919, at Asheville, N. C. Headquarters, Battery Park Hotel.

W. T. MARTIN, *Secretary*,
Benson, N. C.

The Ohio State Dental Board of Dental Examiners will hold their regular examination at the Ohio State University for applicants who desire to practise dentistry in Ohio, on the fourth Monday of June, 1919; examination will begin at 8 o'clock A. M.

Application must be in the hands of the Secretary by June 12th.

A. F. LINSCOTT, *President*, Marion, Ohio.
Holston Bartilson, Secretary, 150 East Broad St., Columbus, O.

The next meeting of the Tennessee State Board of Dental Examiners will be held in Nashville, Tennessee, June 30th, 1919, for the examination of candidates for registration. All applications must be in the hands of the Secretary on or before the 20th of June.

F. W. MEACHAM, D.D.S., *Secy-Treas.*
Chattanooga, Tennessee.

Reunion and Convention of the Psi Omega Fraternity, Ohio Alumni Chapter, will be held at Cedar Point, Ohio, July 7 and 8, 1919.

E. L. PETTIBONE, *Chairman.*
6503 Detroit Ave., Cleveland, Ohio.

Notice is hereby given that there will be a meeting of the Arizona Board of Dental Examiners, at Phœnix, Arizona, beginning July 10, 1919, to examine candidates for a license to practise dentistry in Arizona, and to transact such other business as may properly come before the board. Application blanks may be secured from Secretary of State, Phoenix, Ariz.

W. P. SIMS, *Secretary of Board*,
Box 58, Bisbee, Ariz.

The Fifty-second Annual Meeting of the Tennessee State Dental Association will be held at the Hotel Hermitage, Nashville, Sept. 4-5-6, 1919.

From all appearances our program promises the greatest meeting ever.

JAMES J. VAUGHN,
Chairman Pub. Com.

The Association of Military Dental Surgeons of the United States will hold its annual meeting at New Orleans, October 20 to 24, 1919.

R. W. WADDELL, *Sec'y-Treasurer.*

An invitation is extended to every member of the National Dental Association to attend the Twenty-third Annual Session of the Association, October 20, 21, 22, 23, 24, 1919, in New Orleans, La. C. V. VIGNES, *President.*

JOS. P. WAHL, *Chairman Local Committee.*